Choose Solar

Choose Solar™ Solar Water Heater

Installation and User's Manual

Contents

About us **3**
Glossary **4**
1. End-user Information **5**
1.1. Introduction 5
1.2. Solar Water Heater 5
1.2.1. Solar Water Heating Process 5
1.2.2. The Choose Solar Advantage 6
1.2.3. Vacuum Tube Collectors 7
1.3. Gas boosting 8
1.4. Electric Boosting 8
2. Important Information **9**
2.1. Standards and Regulatory Requirements 9
2.2. Water Pressure 9
2.3. Water Temperature 10
2.4. Water Quality 11
2.5. Corrosion 11
2.5.1. Galvanic Corrosion 11
2.6. Freeze Protection 12
2.7. Wind Loading 12
2.8. Hail Resistance 13
2.9. Lightning Protection 13
2.10. Stainless Steel Tanks and Hydrogen Build-up 13
3. Solar Water Heating System Installation (for Installer) **13**
3.1. Installation Summary 13
3.1.1. Pre-installation 13
3.1.2. Installation Process 14
3.1.3. Post Installation 14
3.2. Site Inspection and Planning 14
3.3. System Design 14
3.3.1. System Choice 14
3.3.2. System Sizing 15
3.3.3. Commercial Property 15
3.3.4. System Diagrams 16
3.4. Installation Preparation 19
3.4.1. Component List 19
3.5. Transportation, Unpacking and Inspection 22
3.5.1. Tube Inspection 22
3.6. Solar Collector Installation 23
3.6.1. Orientation 23
3.6.2. Frame Installation 23
3.6.3. Roof Attachment 28
3.6.4. Frame Alignment 30
3.6.5. Manifold Installation 30
3.7. Plumbing Connection 30
3.7.1. Insulation 31
3.7.2. Storage Tank Installation 31
3.7.3. Circulation Pump Installation (Wilo RS 15/6) 32
3.7.4. Auxiliary Pump Installation — For RSD-B only (Wilo-Star Z 15) 36
3.8. Gas Booster Installation 37
3.9. Electrical Connection (For Electric Storage Water Heater) 38
3.10. Controller Installation 39
3.10.1. System Controller 39
3.10.2. Terminal Connection 40
3.10.3. Circuit Diagrams 42

3.10.4. Programming System Controller 43
3.11. System Commissioning 45
3.11.1. Filling Hot Water Storage Tank 45
3.11.2. Gas Booster 45
3.11.3. System Controller 45
3.12. Vacuum Tube Installation 45
3.13. Post Installation 46
3.13.1. Complete Checklists 46
3.13.2. Check Solar Water Heater Operation 47
3.13.3. Take Photographs 47
3.13.4. Complete Installation Record and Warranty Forms 47
4. Maintenance and Service Calls 48
4.1. General Observations 48
4.2. Prolonged System Idle 49
4.3. Six Monthly Service 49
4.4. Major Service 49
4.4.1. Draining the Hot Water Tank 50
4.4.2. Insulation 50
4.4.3. Other Components 50
5. Troubleshooting 51
6. Safety Reminders 52
7. Warranty 53
7.1. Warranty Exclusions 53
7.2. Warranty Coverage 54
8. Disclaimer 54
8.1. Scope of Manual 55

About us

Choose Solar is a subsidiary of Drillmate Pty Ltd, which is focused at supplying high quality designed and manufactured renewable energy technologies at competitive prices.

Drillmate Pty Ltd was founded in 1989 by Noel Rankin and has since then produced a series of world class products. Drillmate products implement the latest cutting-technology to improve the efficiency of cavity production in a wide variety of materials.

Over the years, Drillmate Pty Ltd has been awarded for its innovative design, inventions and company operation on multiple occasions. In 1989, Drillmate Pty Ltd received the Australian Design Award and in 1990, the Occupational Health and Safety Award. Other accolades include Best Invention Award (Long Beach, California, U.S.A., August 1992) and Highly Commended Product Award (Australia's International Engineering Exhibition, Melbourne 1997).

Some of the notable innovations of Drillmate include Portable Drill Press, Vac-Pad, Curved Surface Adaptor (C.S.A), Vac-Force 2000 and Pipe-Vac 2000. These Drillmate proprietary standards are internationally known for drilling and are used in many sectors such as plumbing, aerospace, truck and petrochemical industries.

In 2008, a sustainable branch, Choose Solar, was established with the future generation in mind. Through Choose Solar, Drillmate has employed its experience and technologies in developing, manufacturing and supplying sustainable energy products. Since establishment, Choose Solar has been supplying these products at competitive prices to big and small companies as well as individual installers. Choose Solar strongly believes that everyone can make a difference, and will continue to produce quality products that will deliver financial and environmental benefits.

Our Commitment

Choose Solar is committed to provide the highest quality solar energy systems for both the generation of electricity and water heating. All components of the solar energy systems provided by Choose Solar have been subject to rigorous testing and conform to Australian Standards for safe operation, deeming of Environmental Certificates and receiving applicable government support.

Glossary

Air eliminator	A vent positioned at the highest point on the system which automatically releases trapped air to ensure that the sealed system remains air free.
Authorised Person(s)	Qualified tradespersons who hold relevant industry licenses or certificates required for completing the solar water heater installation and/or related work.
Booster	A complementary device for maintaining the water at an intended temperature.
Closed Loop Pressurised System	A solar heating system loop that is closed, separated from the water source, filled with a heat transfer fluid and pressurised.
Flow line	The plumbing line running from the tank to the inlet of the collector.
Header	The copper heat exchanger pipe in the solar collector through which the heat exchanger fluid flows.
Heat Pipe	A high grade copper pipe that is inserted into the standard vacuum tube, which allows rapid heat transfer.
Insolation	Solar radiation level, expressed in kWh/m2/day
Manifold	The unit with houses the header into which the vacuum tubes are connected. Also see *Header*.
Pressure Temperature Relief (PTR) valve	A valve for relieving pressure and excessive temperatures.
Return line	The plumbing line running from the outlet of the collector back to the tank.
Solar Collector	The solar energy collecting unit which includes vacuum tubes, manifold and frame, that is mounted on the roof.
Standard Vacuum tubes	Evacuated glass tubes which insulate the solar absorbers that collect the solar energy to heat the heat exchanger fluid for water heating purposes.
Super Heat Conduction Metal Vacuum (SHCMV) tubes	Fully sealed vacuum tubes which are more efficient in solar energy capture and heat transfer than standard vacuum tubes.
Thermal Stratification (Water)	The effect of temperature layering effect that occurs in water (i.e. hot water rises and cold water sinks to create layers of hot and cold water).
Uninterrupted Power Supply (UPS)	An electrical device that provides emergency power from storage battery, inverter and charging unit to a load when the power supply (i.e. utility mains) fails.

1. End-user Information

1.1. Introduction

This installation and user's manual provides easy to follow instructions for the correct installation and operation of your Choose Solar™ solar water heater. This manual is an essential reference for both the installer and owner of the water heating system. Please read and understand the installation and operating guidelines contained in this manual for smooth operation and optimal performance of your Choose Solar water heater. Please also pay extra attention to any **NOTE(S)** and **WARNING(S)** provided throughout the manual.

This manual contains important information regarding the safe installation and operation of the water heating system.

NOTE(S) requires extra attention while **WARNING(S)** requires strict attention to prevent setbacks such as injury or installation faults.

If you have any questions, please feel free to contact your local Choose Solar dealer.

1.2. Solar Water Heater

A Solar Water Heater (SWH), as its name implies, utilises the solar energy from the sun to supply thermal energy to heat your water. Your Choose Solar water heater is designed to combine the use of both solar energy and purchased energy to supply hot water to your residence and commercial property. SWHs are playing an important role in displacing the greenhouse gas emissions from conventional water heating, which is currently the largest single source of emissions from the average Australian home.

You will experience performance and energy savings after installing the Choose Solar water heater. However, actual improvements will depend on factors such as water usage, weather, temperature, available solar energy, and the cost of purchased energy.

1.2.1. Solar Water Heating Process

The vacuum tubes on the roof are the solar collectors which absorb the solar energy and convert it to usable heat. An electronic controller monitors the temperature of the water in the collector and the water at the bottom of the tank. When the temperature in the collector is greater than that of the tank, it will supply power to the pump to circulate water through the heat exchanger and back to the tank. This process is repeated to heat up the water in the tank. Finally, hot water is delivered to the end-user through an instantaneous gas heater which further heats up the water to a prescribed temperature as required.

This process is illustrated in Figure 1 on the next page.

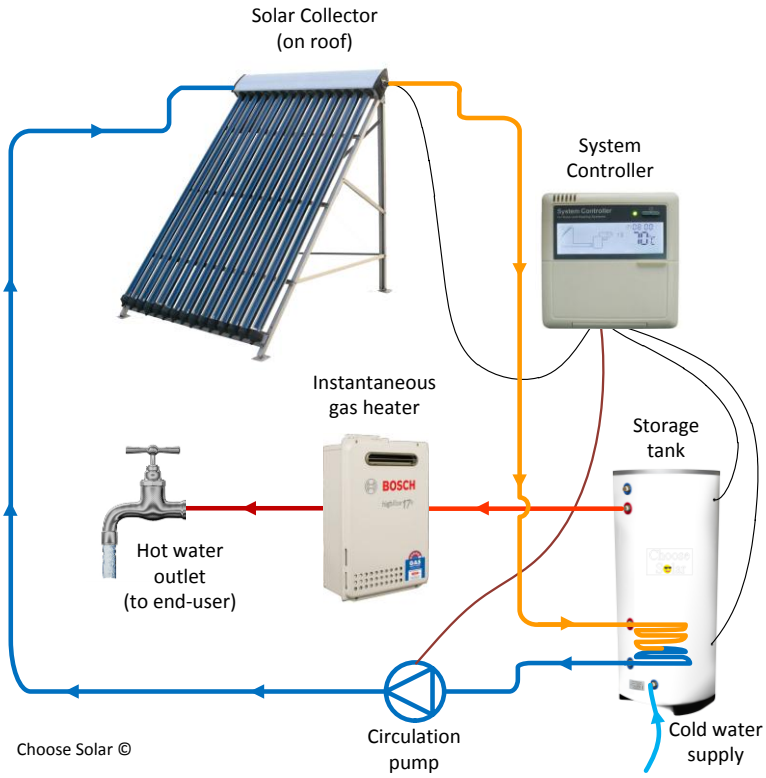


Figure 1

1.2.2. The Choose Solar Advantage

There are many types of Solar Water Heaters in the market and Choose Solar supplies superior quality vacuum tube collectors, stainless steel tanks and supplementary boosters.

Choose Solar supplies the advanced **Super Heat Conduction Metal Vacuum (SHCMV)** tubes— fully sealed vacuum tubes which are more efficient in solar energy capture and heat transfer than standard vacuum tubes. There are two technology patents in solar energy utilisation which are associated with the SHCMV vacuum tubes.

The patents are,

- Glass-metal heat envelopment craftwork (Patent No. 79149)
- Exhausting set for SHCMV tube (Patent No. 455502)

Manufactured with cutting edge technology, **SHCMV tubes are able to offer many additional benefits over standard vacuum tubes** which are commonly available in the market. SHCMV tubes can achieve **higher heat conduction** effectiveness than normal all-glass tubes by more than 10%. These tubes sustain much **lower heat losses** (less than 0.8W/m^2.°C) and can **resist extremely freezing conditions**. Even under -50°C, the average heat efficiency of 50% can still be achieved. It can output usable heat within 2 minutes and the temperature of the cooling end can reach up to 250°C. They also have **greater hail resistance** than standard vacuum tubes —they can resist hail up to 35mm in diameter, and above, when the collector frame is tilted.

SHCMV tubes have **high corrosion resistance** because they are fully sealed. Through heat-pipe conduction, no water runs inside the tube so water contamination problems, tube blockage and low power output caused by water fouling, deposits, dust and sand are avoided altogether.

The solar absorber plate installed and sealed inside the tube of high-quality borosilicate glass is vacuum packed so it does not corrode even in damp areas.

These products are certified products of the Australian/New Zealand Standard 2712 and approved by TÜV Rheinland under the EN12975 Standard. They have also adopted the Chinese National Standard of Q/321282 YZD08-2001 for residential water heating systems while the quality control of manufacturing is certified by ISO9001:2000.

1.2.3. Vacuum Tube Collectors

Vacuum tube collectors offer many advantages over other types of solar collectors. These include,

- **Easier Installation**
  Vacuum tube collector panels can be quickly and easily installed without a hoist because the collector tubes, manifold, and frame are installed separately. Also, the collective weight of a vacuum tube collector is much lighter than other types of collector with single-piece constructions. This can result in savings in installation time and expense.

- **Superior Insulation**
  The vacuum in the collector tubes is an excellent insulator of heat, providing superior resistance to heat losses through conduction and convection, even under extremely cold winter temperatures and windy conditions. This means that once heat is absorbed, it is transferred to the water in the manifold, and not lost to the external environment.

- **Easier Maintenance**
  Faulty tubes can be replaced independently from the collector panel without the need to shut the whole system down. This is because the vacuum tubes are installed in the manifold via dry connections. Generally, cleaning is not required but if you suspect the collector is being covered by dirt or leaves refer to **Section 4. Maintenance and Service Calls** for maintenance instructions. Also, in the event of broken tube(s), the hot water system will still operate normally and safely.

- **Longer Lasting**
  As the SHCMV tubes are fully sealed, the surface of the absorber is protected by the vacuum from moisture and condensation which often cause corrosion and degradation of the absorber coating in other types of collectors. This trait prolongs the life of vacuum tube collectors, which easily exceeds 20 years.

- **Better Efficiency**
  The superior insulation combined with the high heat transfer efficiency means that vacuum tube solar collectors can deliver higher average energy output. This is because, compared to other collector technologies, their higher efficiency earlier in the day, during overcast conditions and cold seasons, could result in higher average performance.

1.3. Gas boosting

Under normal circumstances, the standard recommended size of solar water heater alone will not be able to provide all the energy required to produce hot water all year round.

Choose Solar supplies an instantaneous gas booster as a complementary heating device if natural gas or Liquefied Petroleum (LP) gas is readily accessible. Natural gas burns five to six times cleaner than coal per unit of energy delivered. Hence, this form of purchased energy is less harmful to the environment.

1.3.1. Instantaneous Gas Boosting

The solar collector acts as a pre-heater when an instantaneous gas booster is in place. If the water entering the gas heater is already at a suitable temperature, it will not ignite. Only when the required water is not already adequately heated by the solar heating system, then the water is further heated by the gas booster. This is therefore a more efficient system arrangement.

Choose Solar has systems which utilise an instantaneous inline gas booster. Therefore, the requirement below prescribed by Australian Standard 3498 will apply:

"The water heater is a storage solar water heater with an instantaneous inline booster where the booster heats the water to a minimum of 70°C before passing through the booster's heated water outlet if the water from the solar water heater is less than 55°C."

This requirement **MUST** be adhered to, when installing and configuring the water heating system.

Having an instantaneous gas booster ensures that continuous hot water is supplied even on days when the solar energy collected is inadequate for meeting the hot water consumption levels. The gas booster also plays an integral role in the anti-freezing function controlled by the system controller and is particularly important to safeguard against Legionnaires disease. It is therefore important to note that **the gas booster must be switched ON at all times**, including summer months.

1.4. Electric Boosting

Where natural gas or Liquefied Petroleum (LP) gas is not readily available, Choose Solar supplies an electric storage water heater as a complementary heating device. The Choose Solar electric boosted system utilises electric element to boost the water temperature as required. The electric element is controlled by the system controller which switches it on at set times.

Similarly, the electric boosted solar water heating system also has the function of inhibiting the growth of legionella. It complies with the requirement in Australian Standard 3498 which states:

"For a storage water heater, heat pump water heater or solar water heater, at least 90% of the stored water is heated to 60°C for at least one single period of not less than 32 min in each 7 day period."
The electric booster complements the solar water heating in providing continuous hot water supply, anti-freeze capability and also safeguard against the legionnaires disease. It is therefore important to note that **the electric booster must be switched ON at all times**, including summer months.

2. Important Information

2.1. Standards and Regulatory Requirements

All Choose Solar solar water heating systems must be installed by an *authorised person*. All installation work must meet the requirements of AS/NZS 3500.4, AS 5601 (AG 601), the National Plumbing Code as well as any relevant standards and regulations. This also applies to any gas related and electrical work that may be required.

2.1.1. Authorised Person(s)

An "authorised person" refers to a qualified tradesperson who holds relevant industry licenses or certificates required for completing the solar water heater installation and/or related work.

Unless otherwise specified, no part of the Choose Solar solar water heaters may be inspected, installed, repaired or maintained by anybody other than authorised person(s).

2.2. Water Pressure

The water heater is designed to operate at mains pressure by connecting directly to the mains water supply. The supply pressure should be greater than 350kPa for true mains pressure operation to be achieved. A minimum water supply pressure of 200kPa is required for effective performance. It is necessary to take note of the devices required to make sure the water pressure is controlled for optimal performance.

2.2.1. Pressure Limiting Valve

As the cold water mains pressure supply can often exceed or fluctuate beyond the pressure of 750kPa, a pressure limiting device set at 500kPa must be fitted to the cold water supply line. The Choose Solar plumbing kit includes a Pressure Limiting Valve for this purpose.

Failure to install a pressure limiting device at the cold water mains will void the warranty.

2.2.2. Expansion Control Valve

In South Australia, Western Australia and some other areas (subject to local authority regulations), it is a requirement that an expansion control valve or a pressure relief valve be fitted on the cold water supply to the water heater. Drain lines from relief valves are not permitted to be joined so a separate drain line must be provided for this valve.

As a precautionary measure, Choose Solar encourages you to install an expansion control valve and set it at 600kPa, even if your state or area does not mandate you to do so. An expansion control valve is supplied in the Choose Solar plumbing kit.

2.2.3. Pressure Temperature Relief Valve

The hot water tank is fitted with a pressure temperature relief (PTR) valve set at 700kPa to ensure safe operation of the system. It is designed to discharge small quantities of hot water from time to time during heating to allow a degree of hot water expansion.

It is recommended that the PTR valve be operated once every **6 months** to maintain reliability of the system. This operation can remove lime deposits and verify that the valve is not blocked. The valve must be released with care as the water coming out will be **HOT** and can be in the form of steam. An open ended copper drain line (i.e. open to the atmosphere) should be connected to the PTR valve to channel the water downward to a safe and appropriate drainage location. See **Section 4. Maintenance and Service Calls** for more information. A PTR valve is supplied in the Choose Solar Plumbing Kit.

2.3. Water Temperature

Hot water systems can store water at temperatures above 50°C which is capable of causing scalding. In fact, solar water heaters can generate temperatures in excess of 85°C. In which case, it is a regulatory requirement for a tempering valve to be fitted to prevent hot water exceeding the maximum safe temperature (i.e. not more than 50°C) from reaching the end-user. A tempering valve is provided in the Choose Solar plumbing kit.

During cold and cloudy conditions, the solar water heater may not be able to generate enough heat to provide the amount of hot water up to the temperature required by regulation. This is when a gas booster starts to play its role.

Although temperatures below 50°C could already be adequate for showers, it is an Australian Standard requirement that the hot water in the storage tank be heated up to a minimum of 70 °C for at least 1 second (e.g. system with instantaneous gas booster) or a minimum of 60 °C at least once every 24 hours (e.g. system which supplies hot water directly from storage tank) before consumer use. This is to eliminate the Legionella bacteria that may be present in the water. Hence, the **booster must always be switched ON** to make sure that this does happen.

2.3.1. Water Boiling Temperature

If a pressure valve (i.e. PTR valve) is activated to release excess pressure, the figures below are the potential temperatures of the water or steam that may be discharged.

Pressure (kPa)	Boiling Point (°C)
101	100
203	120
304	133
405	143
507	151
608	158
709	164
811	170

WARNING: Hot water and pressurised steam can burn and cause severe scalding! Care should be taken to avoid contact with any pipe or fixtures associated with the heat collector flow and return lines. Occupational Health and Safety Regulations must always be adhered to.

2.3.2. Steam in Water Heating System

If the pressure of the water supply (e.g. mains, water tank, bore water supply) entering the hot water system is below 400kPa, "crackling" or "banging" noise may be heard from the pipes. This

happens more often during stagnation conditions when there is minimum hot water usage but plenty of sunlight. The noises are caused by the formation of steam in the pipe lines when hot water taps are opened. This condition is not dangerous but can be disturbing and noisy. Installing a pressure pump to increase the pressure from the cold water mains to above 400kPa should greatly reduce, if not eliminate the noises.

2.4. Water Quality

Municipal water supplies do not usually cause problems to the solar water heating system. However, if they do, frequent and expensive maintenance may be required. High mineral content in the water can cause lime scale formation which may block up plumbing in hot water systems. Generally, the higher the pH, the hardness and temperature of the water, the quicker the scale will form.

In which case, it is extremely important that the water supply must meet the following requirements. If in doubt, contact your local water authority and/or have your water tested.

Condition	**Measure**
Dissolved solids	< 600 mg/L or ppm
Hardness	< 200 mg/L or ppm
Chloride	< 250 mg/L or ppm
Free Chlorine	< 5 mg/L or ppm
Magnesium	< 10 mg/L or ppm
Sodium	< 150 mg/L or ppm
Electrical conductivity	< 850 uS/cm
pH levels	Min 6.5 – Max 8.5

If water supply is very hard (> 200 mg/L or ppm), the recommended solution is to use water softening treatment to ensure long term optimal operation of the water heating system. Always consult your installer regarding your water quality issues. Failure to address the water quality problems will result in voiding the warranty.

2.5. Corrosion

In warm environments, water with high chloride concentration can become a corrosive agent. In order to provide maximum corrosion resistance, the Choose Solar solar collectors use high purity (99.93%) copper piping for the manifold. The stainless steel tanks have also undergone rigorous corrosion resistant treatment. Hence, Chloride levels present in most reticulated potable water supplies are safe to be used with the water heating system. It is not suitable, however, to utilise the solar water heater to heat chlorinated pool or spa water which has free chlorine concentrations above the recommended levels as indicated in the **Section 2.4. Water Quality**.

2.5.1. Galvanic Corrosion

Galvanic corrosion can occur when two dissimilar metals are in moist contact. Zinc galvanised components should **NOT** be installed in direct contact with stainless steel, as galvanic reaction between them may cause corrosion of the zinc coating and the steel underneath. ZincAlume steel is less susceptible to the same corrosion but a rubber pad should always be used to avoid the roofing material being damaged.

Choose Solar can supply and recommends the use of stainless steel mounting fasteners. However, if galvanised components are used, non-conducting separators (e.g. fibre washes, rubber pads, etc.) should be employed to avoid direct contact between the two metals.

Corrosion related damages are not covered by warranty.

2.6. Freeze Protection

Choose Solar's solar water heating systems have been tested to comply with AS/NZS 2712's Protection against freezing to Level 2 conditions. Choose Solar's system controller is programmed to provide automatic freeze protection to the solar water heating system. When the temperature at the solar collector is below the pre-set frost protection temperature (2—10°C), the circulation pump is switched ON, and when collector temperature is 5°C above the pre-set protection temperature, the pump is stopped.

The Choose Solar vacuum tubes and manifold are designed to withstand cold weather conditions. They have been tested to resist extreme low temperature down to -50°C. **They do not require integrated freeze protection such as antifreeze chemical liquids unless required to operate in winter temperatures below -5°C for extended periods.**

If antifreeze is needed, only food grade heat transfer fluids (e.g. food-grade polypropylene glycol) should be used. Always refer to the product manufacturer's specification for appropriate usage of the heat transfer fluids (i.e. fluid concentration, indicator colour, replacement instructions, etc.). Health and safety regulations must be adhered to at all times. Choose Solar will not be held responsible for the improper choice and use of heat transfer liquids.

In areas where frequent winter temperatures and/or power outages are experienced, the use an Uninterrupted Power Supply (UPS) unit is recommended to maintain the freeze protection.

Freeze related damages are not covered by warranty.

2.7. Wind Loading

Choose Solar offers a variety of quality frames which come with superior mounting systems. Wind resistance and the resulting stress at attachment points need to be considered when installing the solar collectors. The weight of the solar collectors themselves is quite minimal and should not produce excessive weight stress on the roof structure. However, the integrity of the roof must be checked and relevant building codes and/or regulations need to be observed at all times.

Choose Solar mounting systems have been designed to withstand wind forces up to 180 kilometres per hour (gale force winds). These systems have been proven and readily accepted for the mounting of solar photovoltaic panels which are heavier than the vacuum tube collectors for solar water heating. A range of mounting bolts for attachment to tiled and metal roofs as well as timber and steel purlins or rafters, are available if required.

Choose Solar has the expertise and experience in manufacturing reliable frames and mounting systems to suit a variety of applications. For more information or customised orders, contact your local Choose Solar dealer.

2.8. Hail Resistance

Choose Solar vacuum tubes are quite strong. The SHCMV tubes are able to withstand impact from hail up to 35mm in diameter. The ability for the solar collectors to withstand hail impact greatly depends on the angle of the impact. Solar collectors installed at an angle of 45° or more have greater impact resistance from hail than those mounted at lower angles. Hence, in areas prone to hail storms with hailstones larger than 35mm, it is recommended that the collector be mounted at an angle of greater than 45°.

2.9. Lightning Protection

For locations prone to lightning strikes, it is recommended that an earth line be installed from the copper circulation loop of the collector to avoid lightning related damage and/or electrical safety issues. Always refer to local building codes regarding lightning safety and grounding.

2.10. Stainless Steel Tanks and Hydrogen Build-up

Choose Solar hot water tanks are manufactured using high grade stainless steel that could do without the need for anodes as long as the water quality prescribed are observed. However, sacrificial anodes *will* still be provided with the tanks as a precautionary measure to provide additional protection to the tank and the overall water heating system. This will further increase the water heating system's resistance to poor quality water and prolong its life.

It must also be noted that when anode corrodes to protect the system, small quantities of hydrogen gas will be produced. This gas is usually flushed out from the tank when hot water is being used. However, if the hot water system is not being used for more than two weeks (e.g. end-user gone on holiday), there may be a hydrogen build-up which could become a safety hazard.

WARNING: After prolonged idle time (i.e. two weeks or more), a hot tap at an open sink, basin or bath (NOT at a dishwasher, clothes washer or other appliance.) should be turned ON for several minutes to allow any accumulated hydrogen gas to be discharged while ensuring adequate ventilation. You may hear an unusual high pitched sound as the gas escapes. If in doubt, contact an authorised person or your local Choose Solar dealer.

WARNING: Do not ignite anything (e.g. cigarette, stove, etc.) close to where this operation is being carried out.

3. Solar Water Heating System Installation (for Installer)

3.1. Installation Summary

Choose Solar recommends following the processes in the summary below. These processes are expanded in the following sections.

3.1.1. Pre-installation

1. Site inspection and planning.
2. Installation preparation.

3.1.2. Installation Process

1. Transportation, unpacking and inspection.
2. Solar collector installation.
3. Plumbing and gas connection.
4. Gas booster installation.
5. Controller installation.
6. System Commissioning.
7. Vacuum tube installation.

3.1.3. Post Installation

1. Complete installation checklist.
2. Check hot water system operation.
3. Take Photographs.
4. Complete Installation Record and Warranty Forms.

3.2. Site Inspection and Planning

Please note that the installer is responsible for site inspection prior to the installation to determine the suitable type and size of system, suitable installation location for solar collector and storage tank, framework, equipment and other items required for the installation.

WARNING: It is very important to read and understand this installation and user's manual thoroughly before undertaking the installation. Proper planning prior to performing the installation is crucial.

WARNING: The installer is responsible to ensure that the installation of the solar water heater must NOT compromise the structural integrity of the building or installation site.

3.3. System Design

Choose Solar provides multiple system designs which comply with Australian Standards (AS/NZS 2712) and other relevant requirements such as WaterMark and AS3498. After the site inspection and discussion with end-user regarding the hot water needs, the installer should recommend the system design and size that are most suitable. The installation of a chosen system should only proceed with the consent of the customer.

If customers wish to make alterations to the standard system designs provided, professional advice for the design and installation of the solar heating system from an authorised person must be sought and approved by relevant authorities.

Choose Solar will **NOT** be held responsible for any design which deviates from the approved designs contained in this manual, or any damage of supplied components as the result of inappropriate design.

3.3.1. System Choice

Two system designs from Choose Solar Residential System Design A (RSD-A) and Residential System Design B (RSD-B) are intended to suit different hot water requirements at least cost.

Generally, if most of the amount of hot water used during peak usage (i.e. evening) can be supplied through solar water heating, you can go with RSD-A. However, if your hot water usage regularly exceeds the available hot water supply during peak usage it will be sensible to go for RSD-B with the auxiliary pump. This pump circulates the hot water from the instantaneous gas booster to the upper portion of the tank to heat up the already warm water, instead of heating the whole storage tank starting from the cold water at the bottom. This design delivers usable hot water faster with the minimum amount of purchased energy and hence, the more efficient and economical option for the second scenario.

Residential System Design (RSD-C) utilises electric boosting with the pre-heated storage tank by the solar collector. This option is ideal for those who seek a greener alternative where gas supply is not readily available.

The end-user must discuss the hot water usage with the retailer and installer to determine the best system and its size to be installed.

3.3.2. System Sizing

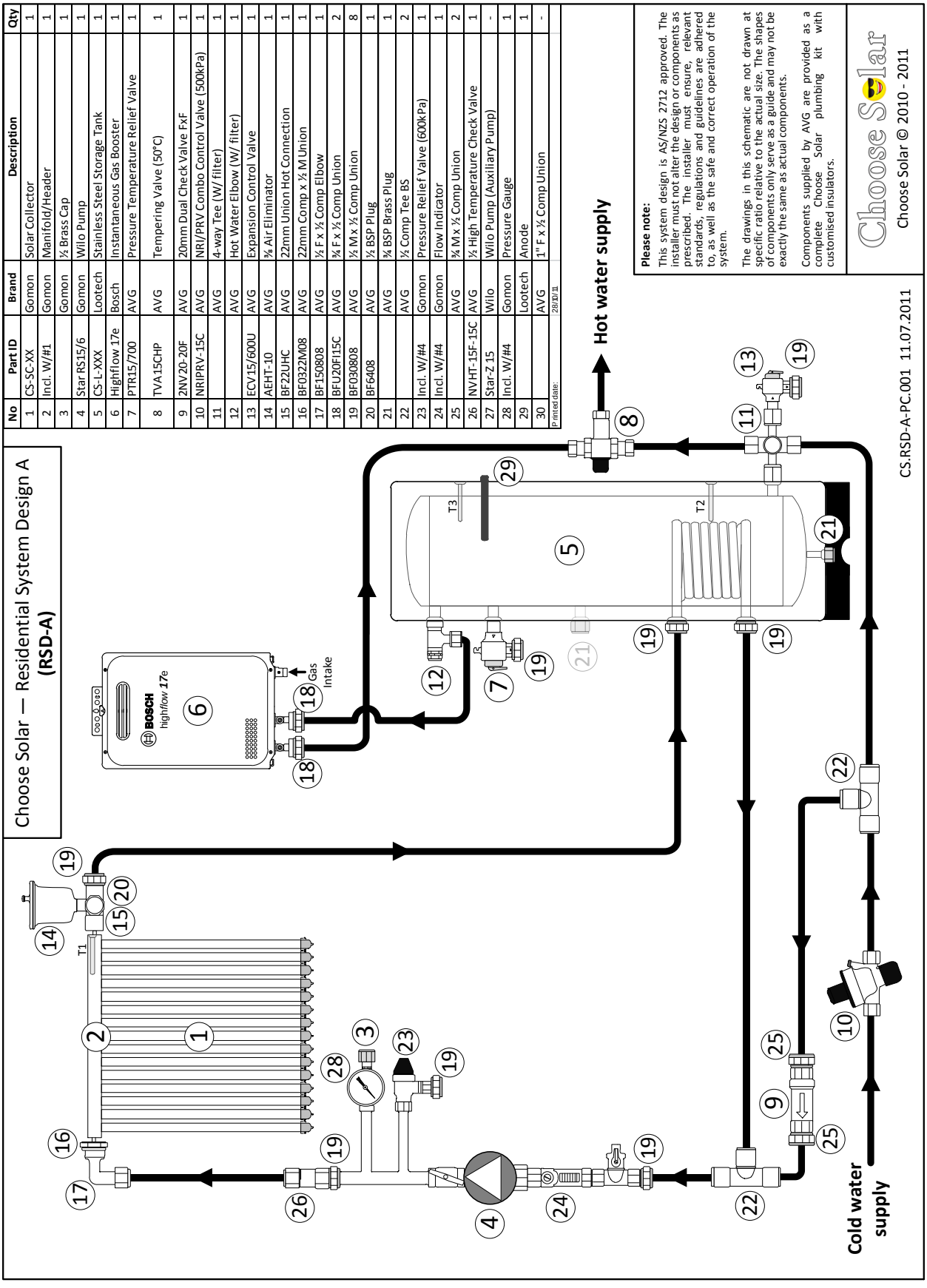
Correct sizing is very important to ensure optimal performance and avoid overheating. The solar water heating system should be able to provide the hot water required by the consumer during summer, with little or no gas boosting required. In winter it should be able to provide approximately 50% of the hot water needs. This means the system should be able to provide between approximately 60 to 80% of the annual requirements.

3.3.3. Commercial Property

Choose Solar's highly efficient Solar Water Heaters can suit commercial applications as well. Speak to your retailer about sizing options to meet your commercial property hot water needs.

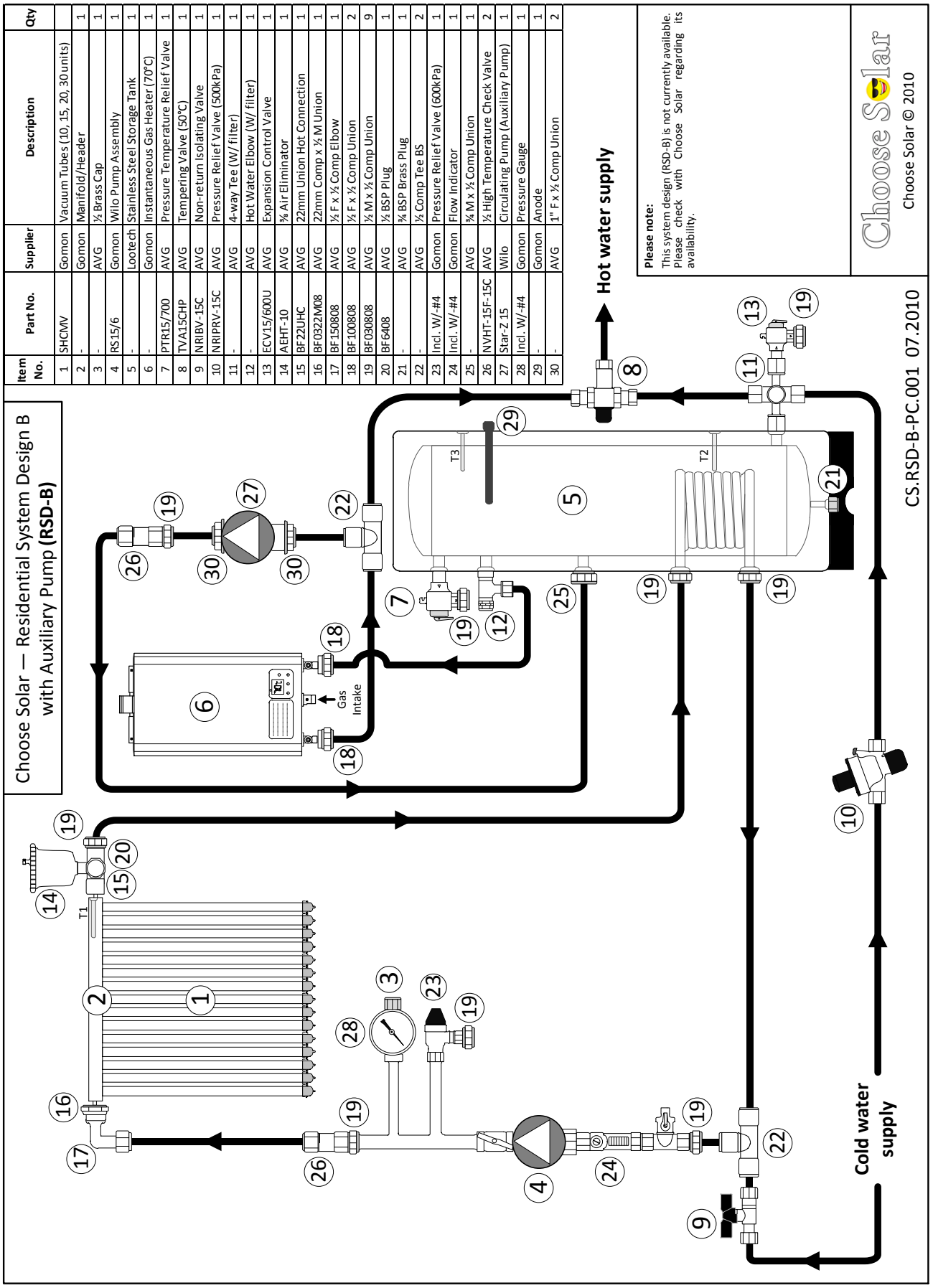
3.3.4. System Diagrams

3.3.4.1. **Choose Solar — Residential System Design A** (RSD-A) Gas Boosting


Choose Solar — Residential System Design A
(RSD-A)
Hot water supply
Cold water supply
Gas
Intake
BOSCH
high flow 17e
T1
T2
T3
Please note:
This system design is AS/NZS 2712 approved. The installer must not alter the design or components as prescribed. The installer must ensure, relevant standards, regulations and guidelines are adhered to, as well as the safe and correct operation of the system.
The drawings in this schematic are not drawn at specific ratio relative to the actual size. The shapes of components only serve as a guide and may not be exactly the same as actual components.
Components supplied by AVG are provided as a complete Choose Solar plumbing kit with customised insulators.
Choose Solar
Choose Solar © 2010 - 2011
CS.RSD-A-PC.001 11.07.2011

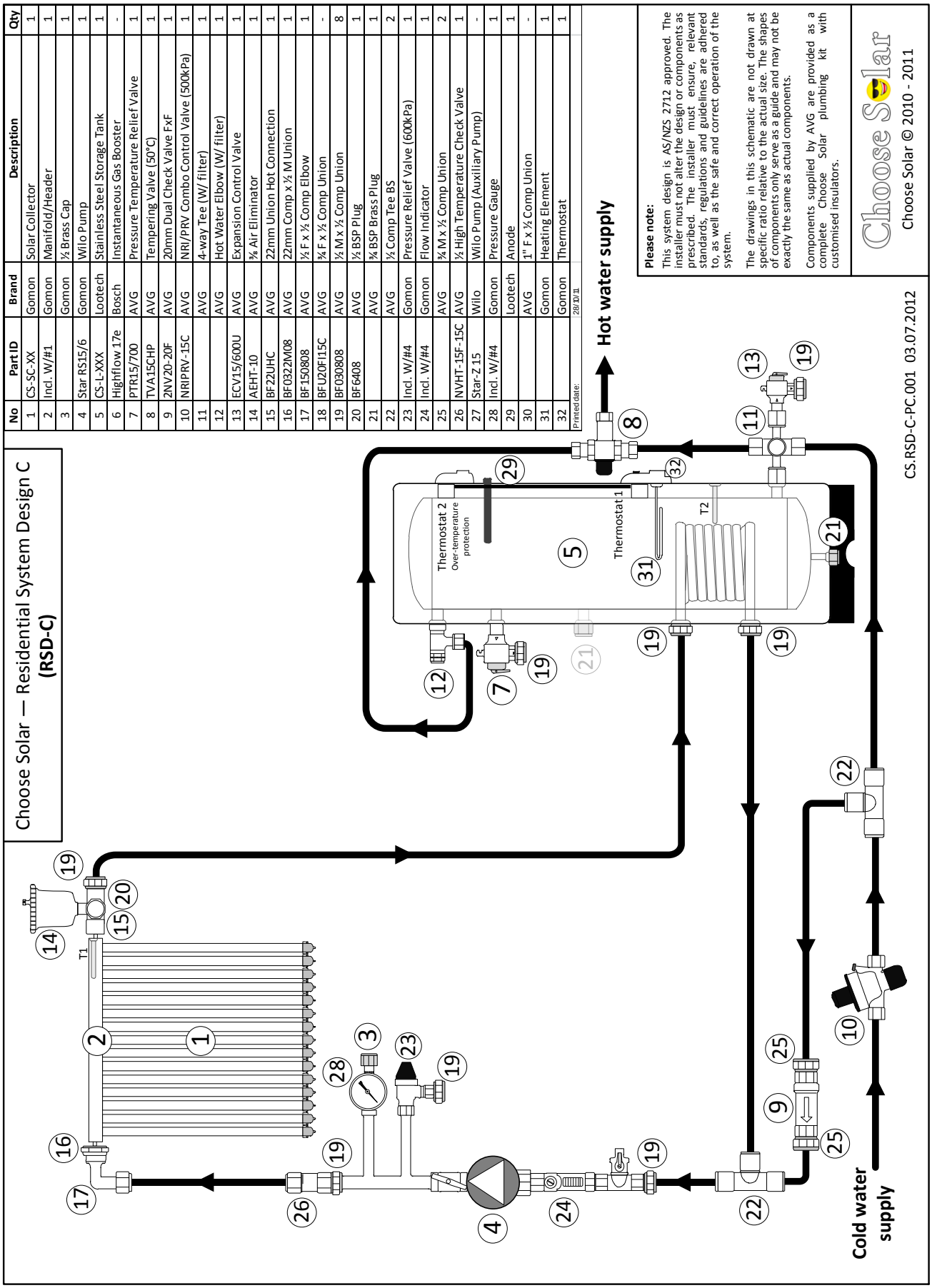
No	Part ID	Brand	Description	Qty
1	CS-SC-XX	Gomon	Solar Collector	1
2	Incl. W/#1	Gomon	Manifold/Header	1
3		Gomon	½ Brass Cap	1
4	Star RS15/6	Gomon	Wilo Pump	1
5	CS-L-XXX	Lootech	Stainless Steel Storage Tank	1
6	Highflow 17e	Bosch	Instantaneous Gas Booster	1
7	PTR15/700	AVG	Pressure Temperature Relief Valve	1
8	TVA15CHP	AVG	Tempering Valve (50°C)	1
9	2NV20-20F	AVG	20mm Dual Check Valve FxF	1
10	NRIPRV-15C	AVG	NRI/PRV Combo Control Valve (500kPa)	1
11		AVG	4-way Tee (W/ filter)	1
12		AVG	Hot Water Elbow (W/ filter)	1
13	ECV15/600U	AVG	Expansion Control Valve	1
14	AEHT-10	AVG	¾ Air Eliminator	1
15	BF22UHC	AVG	22mm Union Hot Connection	1
16	BF0322M08	AVG	22mm Comp x ½ M Union	1
17	BF150808	AVG	½ F x ½ Comp Elbow	1
18	BFU20FI15C	AVG	¾ F x ½ Comp Union	2
19	BF030808	AVG	½ M x ½ Comp Union	8
20	BF6408	AVG	½ BSP Plug	1
21		AVG	¾ BSP Brass Plug	1
22		AVG	½ Comp Tee BS	2
23	Incl. W/#4	Gomon	Pressure Relief Valve (600kPa)	1
24	Incl. W/#4	Gomon	Flow Indicator	1
25		AVG	¾ M x ½ Comp Union	2
26	NVHT-15F-15C	AVG	½ High Temperature Check Valve	1
27	Star-Z 15	Wilo	Wilo Pump (Auxiliary Pump)	-
28	Incl. W/#4	Gomon	Pressure Gauge	1
29		Lootech	Anode	1
30		AVG	1" F x ½ Comp Union	-
Printed date:		28/10/11		

3.3.4.2. **Choose Solar — Residential System Design B** (RSD-B) (Not yet available)


Choose Solar — Residential System Design B with Auxiliary Pump (RSD-B)
CS.RSD-B-PC.001 07.2010
Choose Solar © 2010
Please note:
This system design (RSD-B) is not currently available. Please check with Choose Solar regarding its availability.
Hot water supply
Cold water supply
Gas Intake
T1
T2
T3

Item No.	Part No.	Supplier	Description	Qty
1	SHCMV	Gomon	Vacuum Tubes (10, 15, 20, 30 units)	
2	-	Gomon	Manifold/Header	1
3	-	AVG	½ Brass Cap	1
4	RS15/6	Gomon	Wilo Pump Assembly	1
5	-	Lootech	Stainless Steel Storage Tank	1
6	-	Gomon	Instantaneous Gas Heater (70°C)	1
7	PTR15/700	AVG	Pressure Temperature Relief Valve	1
8	TVA15CHP	AVG	Tempering Valve (50°C)	1
9	NRIBV-15C	AVG	Non-return Isolating Valve	1
10	NRIPRV-15C	AVG	Pressure Relief Valve (500kPa)	1
11	-	AVG	4-way Tee (W/ filter)	1
12	-	AVG	Hot Water Elbow (W/ filter)	1
13	ECV15/600U	AVG	Expansion Control Valve	1
14	AEHT-10	AVG	⅜ Air Eliminator	1
15	BF22UHC	AVG	22mm Union Hot Connection	1
16	BF0322M08	AVG	22mm Comp x ½ M Union	1
17	BF150808	AVG	½ F x ½ Comp Elbow	1
18	BF100808	AVG	½ F x ½ Comp Union	2
19	BF030808	AVG	½ M x ½ Comp Union	9
20	BF6408	AVG	½ BSP Plug	1
21	-	AVG	¾ BSP Brass Plug	1
22	-	AVG	½ Comp Tee BS	2
23	Incl. W/-#4	Gomon	Pressure Relief Valve (600kPa)	1
24	Incl. W/-#4	Gomon	Flow Indicator	1
25	-	AVG	¾ M x ½ Comp Union	1
26	NVHT-15F-15C	AVG	½ High Temperature Check Valve	2
27	Star-Z 15	Wilo	Circulating Pump (Auxiliary Pump)	1
28	Incl. W/-#4	Gomon	Pressure Gauge	1
29	-	Gomon	Anode	1
30	-	AVG	1" F x ½ Comp Union	2

3.3.4.3. Choose Solar — Residential System Design C (RSD-C) Electric Boosting


Choose Solar — Residential System Design C
(RSD-C)
Hot water supply
Cold water supply
Thermostat 2
Over-temperature protection
Thermostat 1
T1
T2
Please note:
This system design is AS/NZS 2712 approved. The installer must not alter the design or components as prescribed. The installer must ensure, relevant standards, regulations and guidelines are adhered to, as well as the safe and correct operation of the system.
The drawings in this schematic are not drawn at specific ratio relative to the actual size. The shapes of components only serve as a guide and may not be exactly the same as actual components.
Components supplied by AVG are provided as a complete Choose Solar plumbing kit with customised insulators.
Choose Solar
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CS.RSD-C-PC.001 03.07.2012

No	Part ID	Brand	Description	Qty
1	CS-SC-XX	Gomon	Solar Collector	1
2	Incl. W/#1	Gomon	Manifold/Header	1
3		Gomon	½ Brass Cap	1
4	Star RS15/6	Gomon	Wilo Pump	1
5	CS-L-XXX	Lootech	Stainless Steel Storage Tank	1
6	Highflow 17e	Bosch	Instantaneous Gas Booster	-
7	PTR15/700	AVG	Pressure Temperature Relief Valve	1
8	TVA15CHP	AVG	Tempering Valve (50°C)	1
9	2NV20-20F	AVG	20mm Dual Check Valve FxF	1
10	NRIPRV-15C	AVG	NRI/PRV Combo Control Valve (500kPa)	1
11		AVG	4-way Tee (W/ filter)	1
12		AVG	Hot Water Elbow (W/ filter)	1
13	ECV15/600U	AVG	Expansion Control Valve	1
14	AEHT-10	AVG	¾ Air Eliminator	1
15	BF22UHC	AVG	22mm Union Hot Connection	1
16	BF0322M08	AVG	22mm Comp x ¾ M Union	1
17	BF150808	AVG	½ F x ½ Comp Elbow	1
18	BFU20FI15C	AVG	¾ F x ½ Comp Union	-
19	BF030808	AVG	½ M x ½ Comp Union	8
20	BF6408	AVG	½ BSP Plug	1
21		AVG	¾ BSP Brass Plug	1
22		AVG	½ Comp Tee BS	2
23	Incl. W/#4	Gomon	Pressure Relief Valve (600kPa)	1
24	Incl. W/#4	Gomon	Flow Indicator	1
25		AVG	¾ M x ½ Comp Union	2
26	NVHT-15F-15C	AVG	½ High Temperature Check Valve	1
27	Star-Z 15	Wilo	Wilo Pump (Auxiliary Pump)	-
28	Incl. W/#4	Gomon	Pressure Gauge	1
29		Lootech	Anode	1
30		AVG	1" F x ½ Comp Union	-
31		Gomon	Heating Element	1
32		Gomon	Thermostat	1

Printed date: 28/10/11

3.4. Installation Preparation

When preparing for an installation, **ALWAYS**

1. Check components (See **3.4.1. Component List Section** below for complete list) that you will be transporting to the installation site to make sure they are all in good condition before departing.
2. Bring along spares of key components such as vacuum tubes and fittings.
3. Ensure any required tools and safety equipment are taken to the installation site.
4. Ensure a copy of this installation manual is available for reference.
5. Bring a digital camera to take photos of the completed installation.

WARNING: The installer must adhere to occupational health and safety regulations outlined by relevant organisations or bodies. The installer(s) is responsible for his/her/their own safety at all times.

3.4.1. Component List

This section lists all the equipment supplied for installation of the standard Choose Solar systems. Check the system designs for the corresponding components required. If any components are missing, or additional parts are required, please contact your local Choose Solar supplier.

3.4.1.1. Collector Tubes

Model ID	Model Name	Brand	Description
GM70 – 1900	SHCMV	Gomon	70mm Solar Vacuum Tubes

Figure 2

3.4.1.2. Manifold and Frame

Aluminium alloy manifold and stainless steel flat roof stand.

Figure 3

3.4.1.3. Solar Collector Specifications

The solar collector dimensions and weights corresponding to the SHCMV tube type installation.

Collector Model	Number of vacuum tubes	Collector Weight* (kg)	Water Capacity (L)	Aperture Area (m^2)	Working Pressure (MPa)	Overall Dimension L×W×H (mm)
CS-SC-10	10	45	100	1.58	0.6	1088×1302×1372
CS-SC-15	15	60	150	2.4	0.6	1578×1302×1372
CS-SC-20	20	80	200	3.22	0.6	2068×1302×1372
CS-SC-25	25	105	250	3.98	0.6	2666x1302x1372
CS-SC-30	30	125	300	4.85	0.6	3062×1302×1372

*Collector weight consists of the weight of completed solar collector (i.e. Vacuum tubes, manifold and frame) that is filled with water.

NOTE:

1. Stainless steel frames are coupled with aluminium alloy manifold for flat roof type installation.
2. These specifications serve only as a guide and are subject to change without notice. (e.g. the height may be influenced by the angle of the roof.)

3.4.1.4. Circulation Pump

Model ID	Model Name	Brand	Description	Purpose
RS 15/6	Wilo-star	Wilo	Glandless circulation pump with threaded connection. (Figure 4)	For heating circuit.
Z 15 (Circostar)	Wilo-star	Wilo	Glandless drinking-water circulating pump. (Figure 5)	For booster water circulation.

Figure 4

Figure 5

Table 1 Pump Kit (Provided with Wilo RS 15/6 pump)

Supplier	Description	Qty
Gomon	Pressure Relief Valve.	1
Gomon	Flow Indicator	1
Gomon	Pressure Gauge	1

3.4.1.5. Storage Tank

Model ID	Brand	Description
CS-L-150	Choose Solar	150L Stainless Steel Tank
CS-L-260	Choose Solar	260L Stainless Steel Tank
CS-L-300	Choose Solar	300L Stainless Steel Tank
CS-L-150e	Choose Solar	150L SS Electric Storage Water Heater (1.5kW Element)
CS-L-260e	Choose Solar	260L SS Electric Storage Water Heater (1.8kW Element)
CS-L-300e	Choose Solar	300L SS Electric Storage Water Heater (2.0kW Element)

Figure 6

3.4.1.6. Gas Booster

Model ID	Model Name	Brand	Description
YS1770RA	Highflow 17e	Bosch	17L Instantaneous Gas Heater

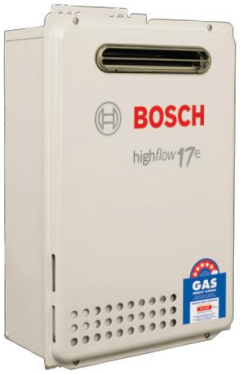


Figure 7

3.4.1.7. System Controller

Model ID	Model Name	Brand	Description
SR868C8	Solar Controller	Shuangri	Solar Water Heating System Controller

Figure 8

3.4.1.8. Plumbing Kits

Choose Solar has prepared plumbing kits specifically customised for Choose solar water heating systems. For more information about the functions and requirements of key components in the kits, please see **Section 2. Important Information**.

NOTE: The plumbing kit for Choose Solar water heater installation also comes with customised insulators to ensure that heat loss through these valves and fittings is reduced to a minimum. This unique feature increases overall efficiency of the solar water heating system as heat loss is significantly reduced. Please note that insulating the pipes is the responsibility of the installer. See **Section 3.7.1. Insulation** for insulation requirements.

3.5.Transportation, Unpacking and Inspection

When transporting the boxes of vacuum tubes, stand the boxes upright wherever possible, taking notice of the orientation arrow on the box. If it is not possible to carry them vertically, then only lay them on a flat, firm surface such as a compressed wooden board. If stacking the boxes, do not exceed 3 layers, and ensure they are securely tied down to prevent movement. The edges of the boxes should be protected from the straps cutting into the boxes.

3.5.1. Tube Inspection

1. Open the tube boxes, which contain the vacuum tubes with heat pipes inserted. Make sure the vacuum tubes are all intact and the bottom of each tube is still silver. If a tube has a white or clear bottom, it is damaged and should be replaced.
2. Do not remove and/or expose the tubes to sunlight until ready to install as the heat pipe tip can become very hot very quickly.

WARNING

- Never touch heat pipe after exposure to sunlight. Wear thick leather gloves when handling heat pipes.
- Always wear safety glasses when handling glass.

Choose Solar does not take responsibility for tubes damaged during transport or installation.

3.6. Solar Collector Installation

3.6.1. Orientation

The orientation of the solar collector is extremely important to achieve the best performance out of the solar water heating system. In particular, the following items need to be considered:

3.6.1.1. Collector Direction

The collector should be facing north as much as possible to receive best solar insolation.

3.6.1.2. Pitch Range

Refer to the Recommended Collector Angles shown in table below.

Table 2 Recommended Collector Angles

Location	Latitude	Acceptable Pitch Range	Optimum Pitch (for annual performance)	Optimum Pitch (for winter performance)
Adelaide	35.0°	20-61°	35.0°	61.0°
Alice Springs	32.0°	20-58°	32.0°	58.0°
Brisbane	27.5°	20-54°	27.5°	54.0°
Canberra	33.0°	20-59°	33.0°	59.0°
Darwin	15.0°	20-43°	20.0°	43.0°
Hobart	42.5°	20-67°	42.5°	67.0°
Melbourne	37.5°	20-63°	37.5°	63.0°
Perth	32.5°	20-58°	32.5°	58.0°
Sydney	34.0°	20-60°	34.0°	60.0°

3.6.1.3. Shading Issues

It is recommended that all shading be avoided between 9am to 3pm as most of the solar energy heating the water is collected during this period. Minor shading caused by TV antennas is not an issue.

3.6.1.4. Storage Tank Location

The solar collectors should be placed as close to the hot water storage tank as possible and the tank should be located as close as possible to where most hot water is used. This avoids long pipe runs between the collectors and tank to reduce heat loss and water wastage due to the hot water "lag". For more information, see **Section 3.7.2. Storage Tank Installation**.

WARNING: Do not install the vacuum tubes until the water heating system is ready to operate with the storage tank filled with water and the closed loop portion has been properly tested for leaks, and pump and controller operation.

WARNING: Do not install the vacuum tubes upside down or lying horizontally, which will cause the heat pipes to not function correctly.

3.6.2. Frame Installation

Installations on roofs or surfaces that have sufficient slope for collector to be adequately exposed to the sun (See Table 2 Recommended Collector Angles) may use the sloping roof configuration.

However, installations on majority of roofs around Australia are anticipated to use the complete tilt frame which is the flat roof type installation in order to harness the optimum amount of solar energy.

3.6.2.1. Sloping Roof

When installing the solar collector bracket shown in Figure 9 below, the lower bar shall be connected by the M6 x 16 bolt to two front pillars and tightened by M6 nut from behind. This procedure is followed by the installation of manifold on the top end of the front pillars.

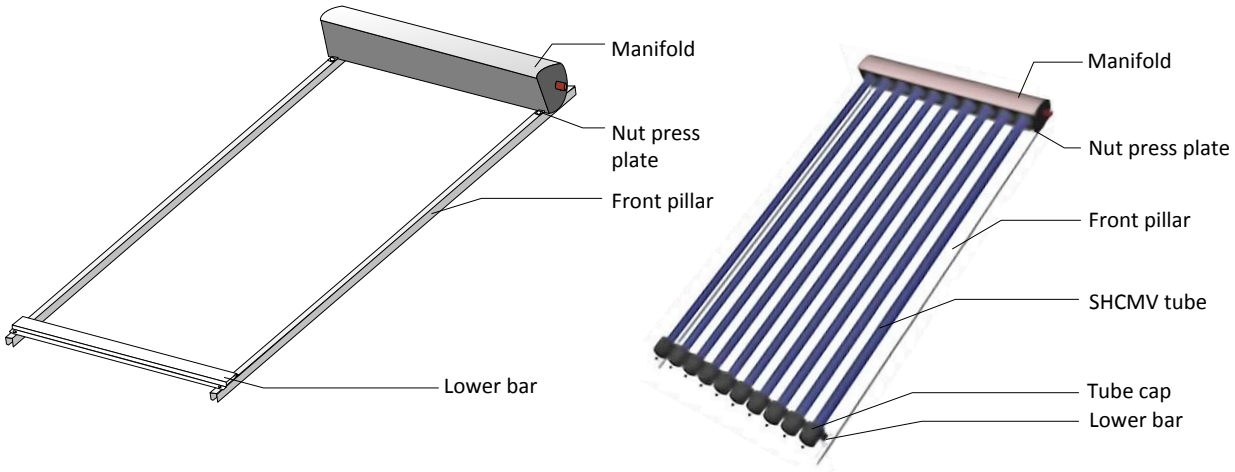


Figure 9

3.6.2.2. Flat Roof

The installation instructions of flat type tilt frame are provided below. A fully assembled frame complete with reflectors is shown in Figure 10 below

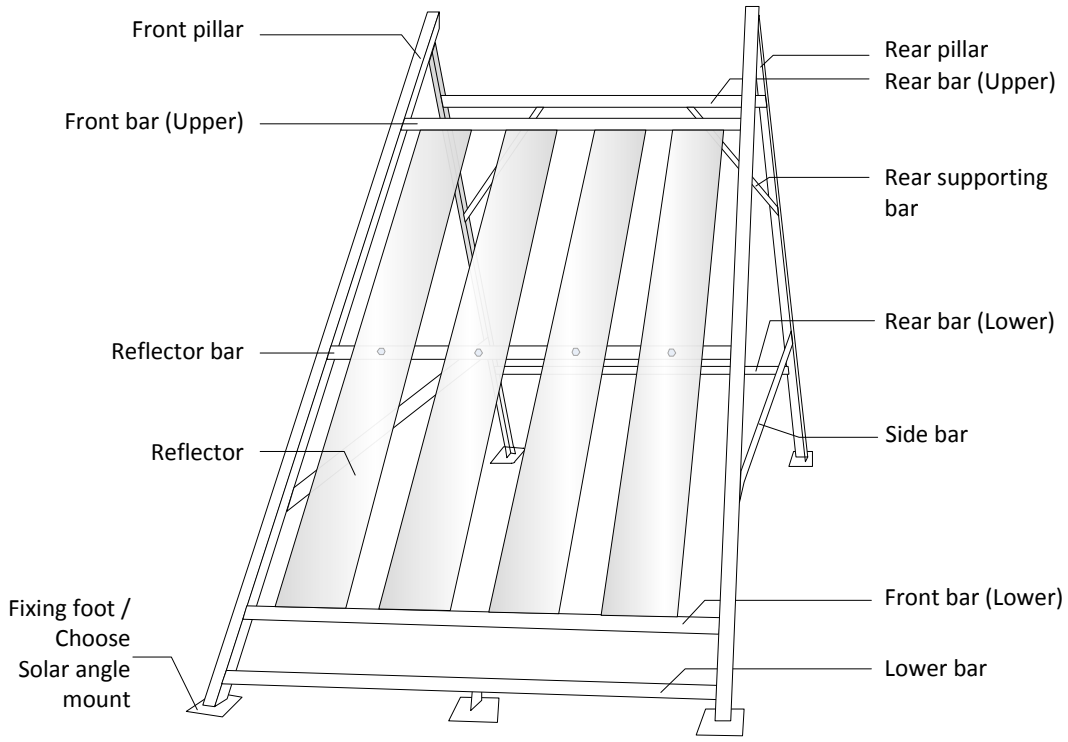


Figure 10

1. Assemble front pillar, rear pillar and side bar into a side frame and fasten them with bolt and nut, then mount fixing foot (or Choose Solar angle mount) on front pillar and back pillar. An assembled side frame is shown in Figure 11 below.

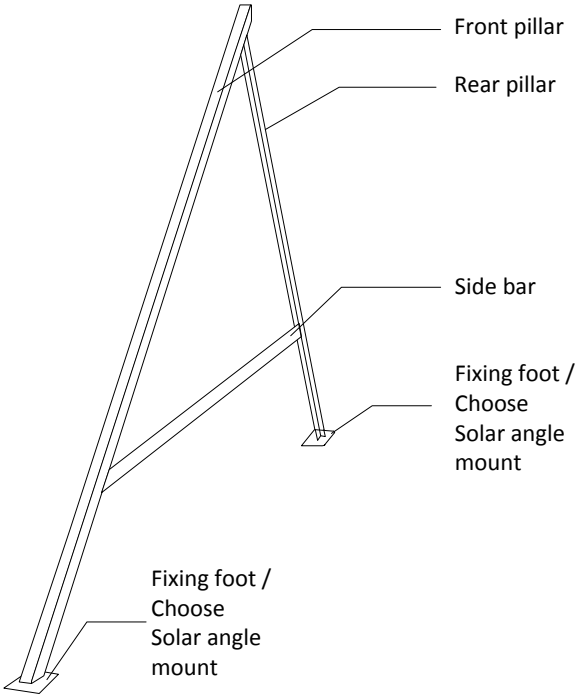


Figure 11

NOTE: The front pillars, rear pillars' angular connection are connected by M6 x 40 bolt and tightened by M6 nut. View of the tightened M6 nut is provided in Figure 12 for guidance.

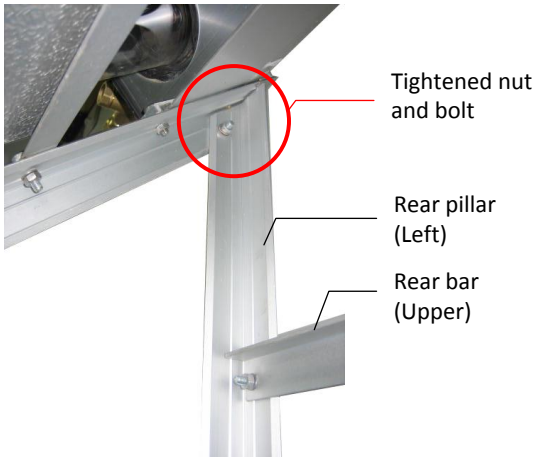


Figure 12

2. The two side frames (i.e. left and right) shall be connected by rear bars, front bars, lower bar, rear supporting bars, and tightened by M6 x 12 bolt and M6 nut. Refer to Figure 13 and Table 3 Frame installation illustrations for more guidance in the frame installation.

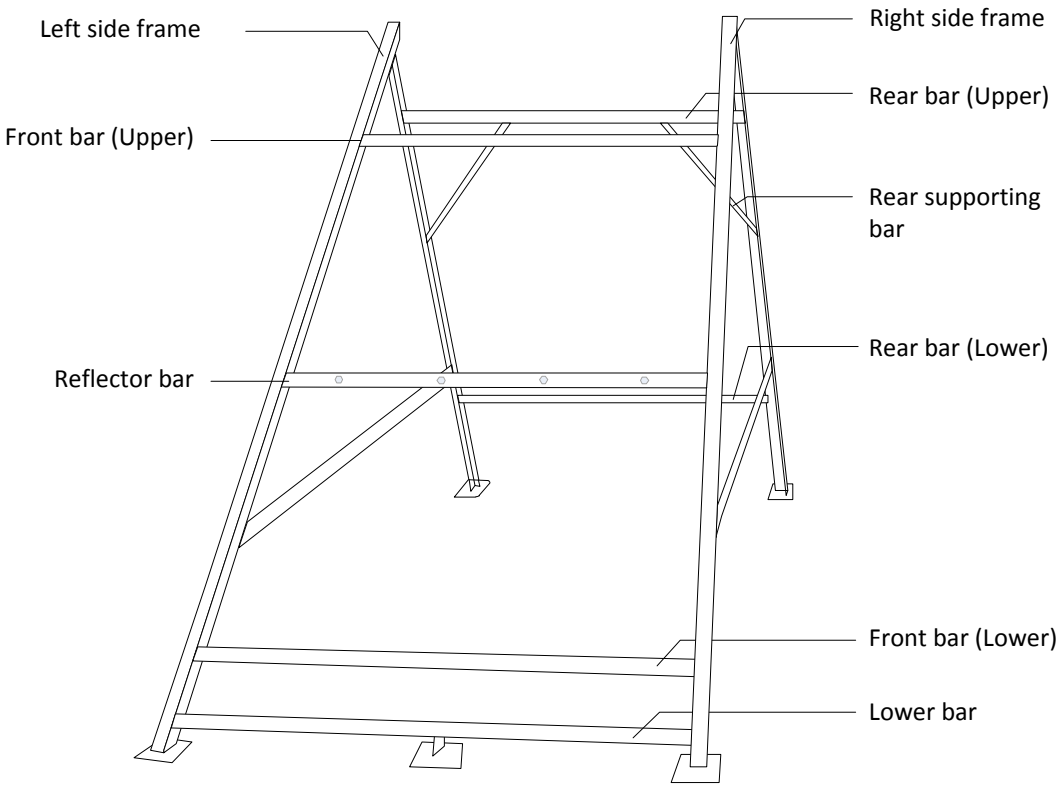
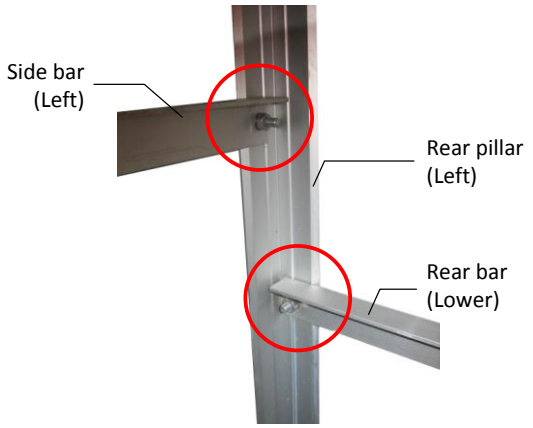
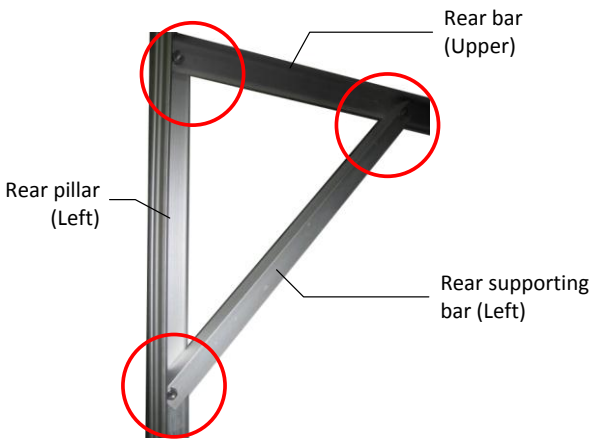
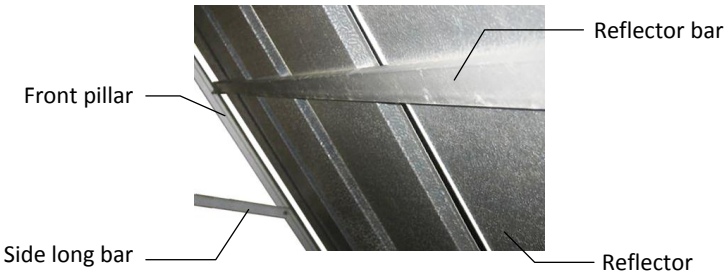


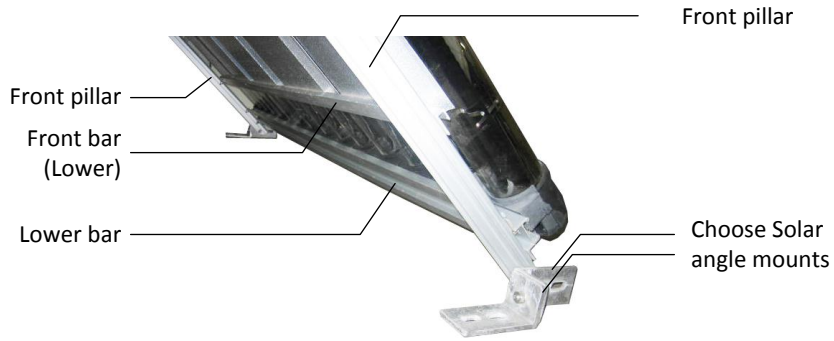
Figure 13

Table 3 Frame installation illustrations









3. The reflector plates shall be clipped into the upper and lower front bars and mounted onto the reflector bar with M6 x 10 bolts. See Table 3 Frame installation illustrations above for guidance.

NOTE: Holes may need to be drilled into the reflector bar to secure reflector onto it with provided bolts. Alternately, rivets may be used.

3.6.3. Roof Attachment

When attaching frame to the roof, wind loading must be considered as it may create excessive stress at the attachment points. It is the responsibility of the installer to determine that the roof (i.e. flat, tiled, corrugated, etc.), which the frame is mounted on, is of suitable strength and structure. See **Section 2.7. Wind Loading** for more information.

For the purpose of attaching the solar collector frames onto the roof, Choose Solar recommends using the Choose Solar 10mm stainless steel mounting bolt which is customised for this very purpose. When correctly installed, each of these bolt made from solid stainless steel can withstand over one tonne of vertical force and resist winds up to 180 km per hour. Their performance has already been proven through the mounting of solar photovoltaic panels which are heavier than the solar hot water collectors. These bolts are also suitable for mounting into a large range of materials including timber and steel purlins.

The following are guidelines for attaching the solar collector frames to common roof types in Australian conditions (for both cyclonic and non-cyclonic regions):

1. For flush mounting, one Choose Solar 10mm Stainless Steel bolt must be used per attachment point.

   NOTE: There are altogether five attachment points, three on front track and two behind.

   NOTE: Choose Solar mounting bolts are available in two lengths (i.e. 200mm and 280mm) to suit different attachment requirements. Choose Solar spacer blocks are suitable to be used with flat and corrugated roofs for safe and secure mounts.

2. Always ensure the roof attachment points are strong enough, obtaining engineering approvals and relevant building permits as required.

Refer to the illustrations in Figure 14 to Figure 17 Tiled roof mount for additional assistance in attaching the Choose Solar bolts and spacer blocks.

3.6.3.1. Corrugated Roof

1. When installing on corrugated steel roof, use rubber pads to separate the frame from coming into contact with the roof and also to seal the hole from allowing water to enter. Use outdoor-grade silicon sealant around the pads to ensure that any cavity is completely sealed. A small amount of silicon may also be put on the thread of the bolt to seal any gap between the bolt and the hole in the pad.

   NOTE: Do not install in the valley of corrugated steel roof unless it is the Kliplok roof (flat valley type and the ridge is not high enough to come into contact with the frame. See Figure 14 and Figure 15.

2. The supplied Choose Solar mounting bolts are made from stainless steel and any contact with the roof material should be avoided to prevent potential galvanic corrosion. See **Section 2.5.1. Galvanic Corrosion** for more information.
3. In order to also avoid any contact of bolt and the roof, drill a larger hole (diameter > 10mm). The washer provided with the bolt should still be left in place to separate bolt from the frame.

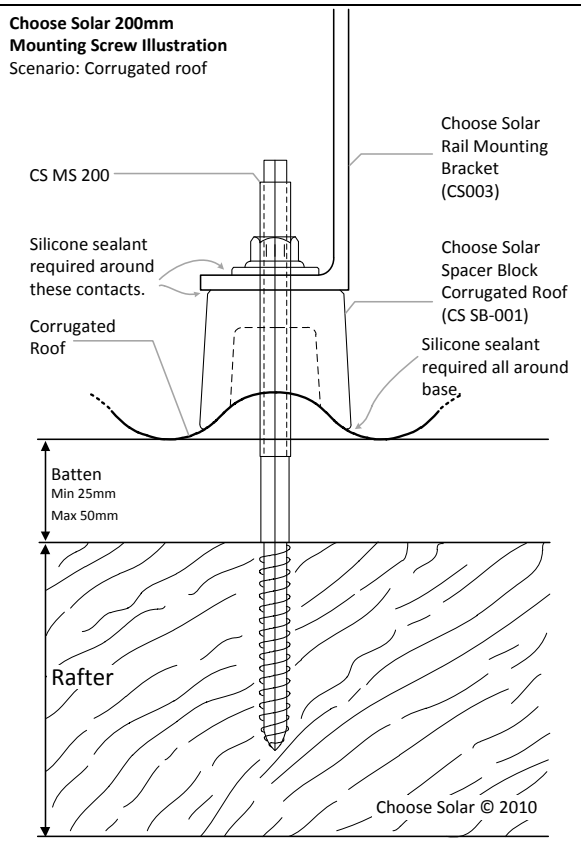


Figure 14 Corrugated roof mount

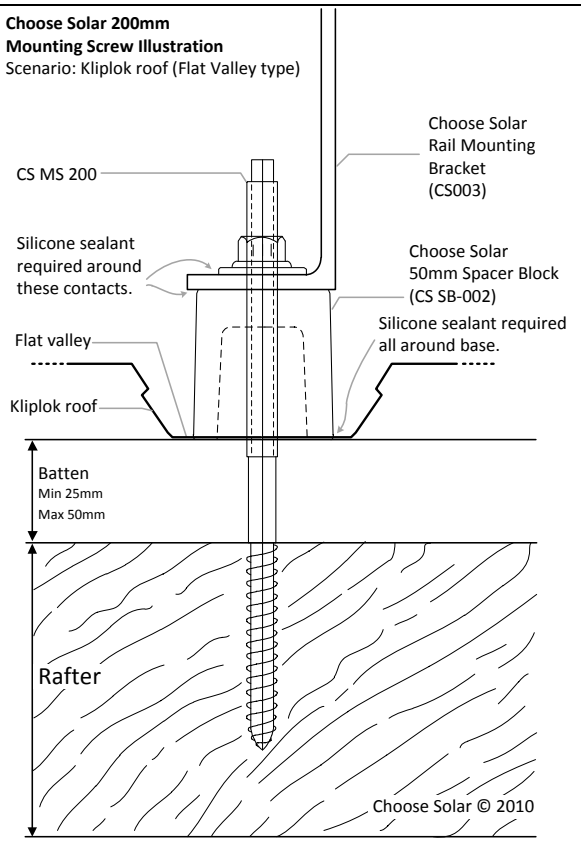


Figure 15 Corrugated roof mount (flat valley type)

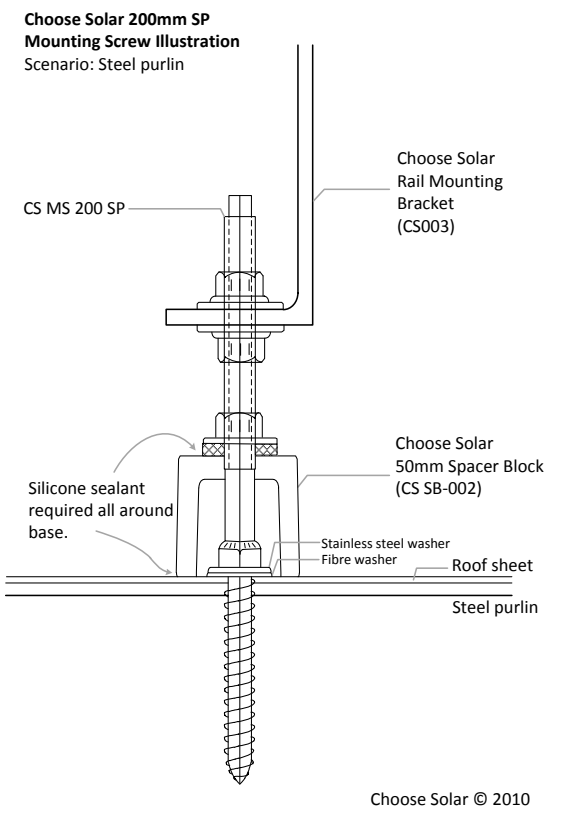


Figure 16 Steel purlin mount

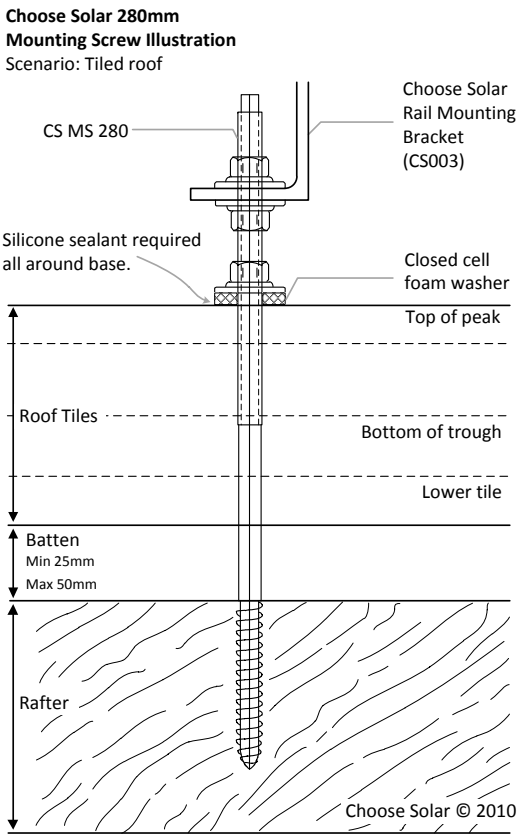


Figure 17 Tiled roof mount

3.6.4. Frame Alignment

The frame must be balanced in order to avoid any damage to the vacuum tubes. The horizontal braces supplied should be used to ensure that the front tracks of the frames are parallel and level. Please make sure that the front tracks are aligned before installing the manifold.

3.6.5. Manifold Installation

The aluminium alloy manifold shall be fastened onto the nut press plate on the front pillar using M6 bolts. See Figure 18 below for guidance.

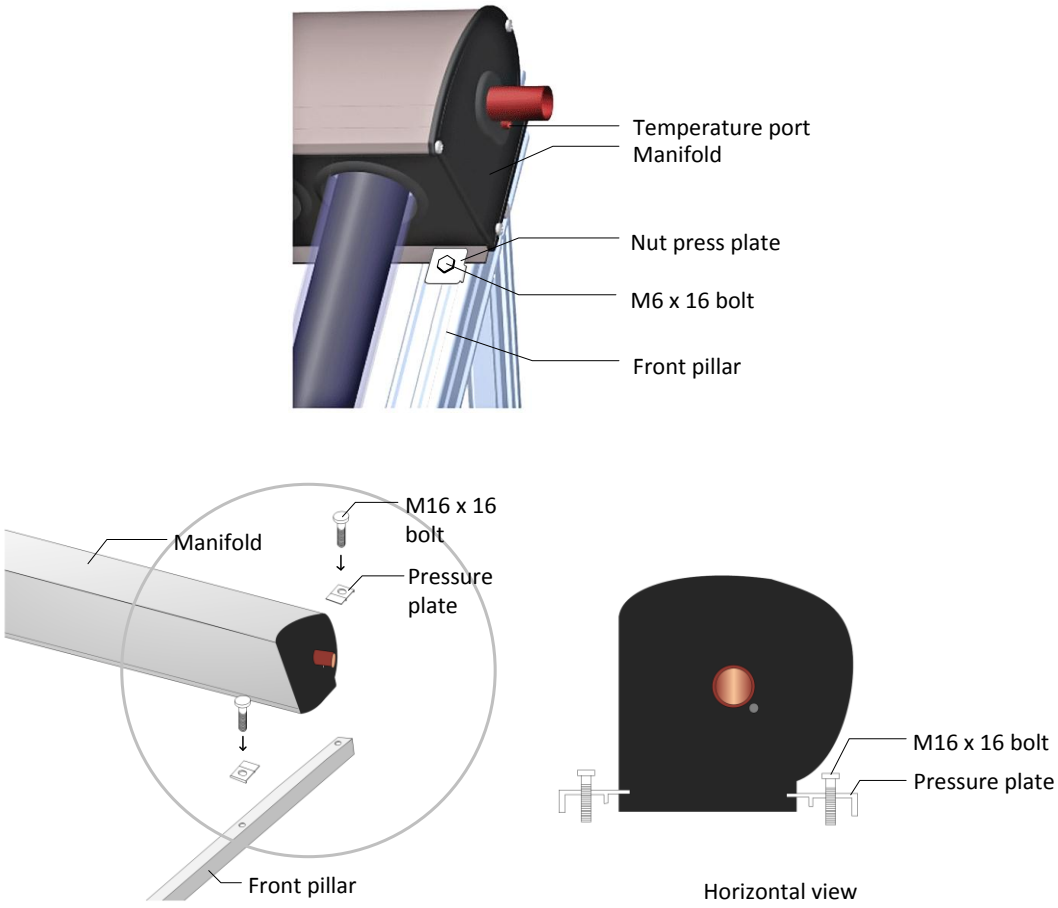


Figure 18

3.7. Plumbing Connection

When the frame is firmly mounted to the roof and the manifold is installed, the plumbing system is ready to be connected.

WARNING: It is the responsibility of the installer to ensure that acceptable piping materials are used and the insulation requirements for pipes between the collector and storage tank are met.

WARNING: Copper tubes used for plumbing, gas-fitting and drainage applications must meet the requirements of AS 1432.

WARNING: Only new detachable hose-sets (if available or requested) supplied with the system are to be used. Any old hose-sets should not be reused.

WARNING: Vacuum tubes should only be installed after the pipes are connected to the storage tank and the system flooded.

Refer to system diagrams in **Section 3.3. System Design** for the approved plumbing arrangement and also locate the best position for the storage tank (See **Section 3.7.2. Storage Tank Installation**). The installer should already have planned out the best plumbing routes prior to carrying out the installation.

WARNING: Only potable water grade brazing material can be used when soldering any part(s) of the plumbing system. Care must be taken to avoid any overheating of system components which may cause damage.

Choose Solar will not be held responsible for damage caused by excessive soldering heat.

3.7.1. Insulation

Proper insulation is very important in avoiding any substantial heat lost through the plumbing in order to maintain good efficiency of the water heating system. Choose solar has customised insulators for the valves and fittings as supplied with the Choose Solar plumbing kits. The installer must ensure that these insulators are in place and also be responsible for the following:

1. The external plumbing pipes should be well insulated by insulators with a minimum thickness of 15mm, or 25mm in colder climates.
2. Internal pipes, particularly the section closest to the tank should be also insulated.
3. Any insulation exposed to sunlight should have a protective layer such as adhesive aluminium foil and vinyl film, to protect against ultraviolet (UV) degradation.

NOTE: More details regarding the insulation requirements are provided in section 8 of AS/NZS 3500.

3.7.2. Storage Tank Installation

The hot water storage tank should be located as close as possible to where most hot water is used with safety in mind. This avoids long pipe runs between the tank and water outlets which contribute to heat loss, as well as water wastage due to the hot water "lag".

Please refer to **Section 3.3. System Design** for the corresponding plumbing connections for the system you are installing. Figure 19 shows the different parts of the storage tank.

The orientation of the tank should also consider future maintenance requirements such as accessibility to cold water inlet piping devices, PTR valve, tempering valves (where fitted), elements, thermostats, sacrificial anode and insulation.

Please note that your Choose Solar storage tank(s) has protection against electrical shock: Class I, and ingress protection rating: IP34.

Choose Solar strongly recommends installing storage tank on ground level and in the upright position, so that it can be accessible without climbing. The pressure temperature relief valve lever should be easily accessible and the product label visible.

In accordance to AS/NZS 60335, the minimum space to be provided for internal/indoor installation is 600 mm x 600 mm.

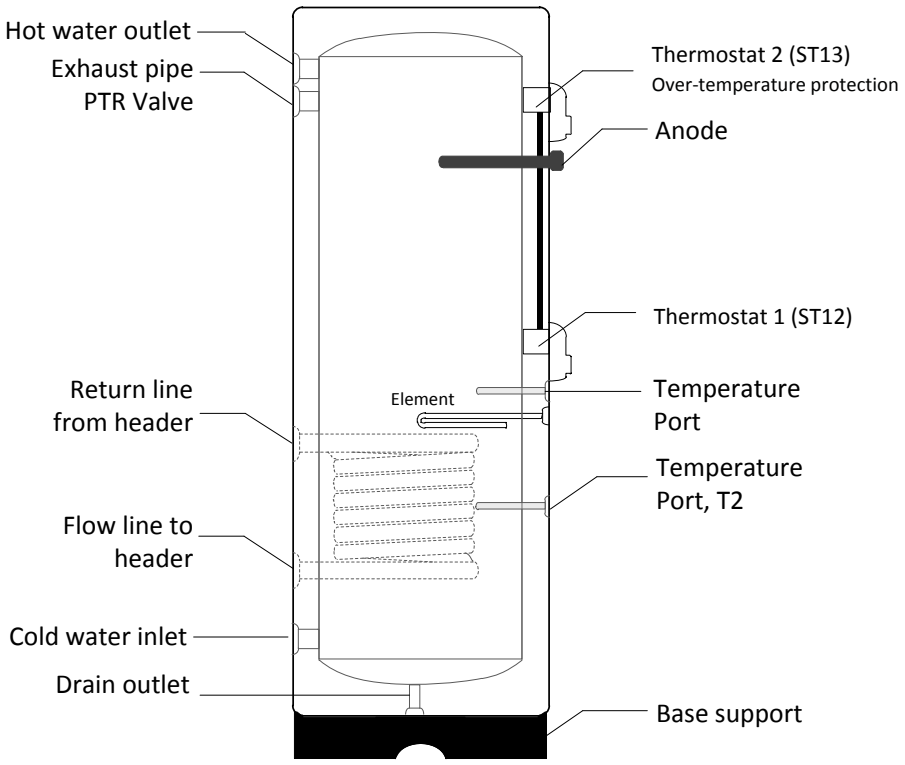
WARNING: The installation must comply with the requirements of AS/NZS 3500.4 and all relevant Australian Standards and industry codes.

The storage tank must have proper support to make sure its position is firm and secure. It should be installed on a level, stable and impervious base supported by the brackets supplied by the manufacturer, and installed in accordance with the manufacturer's instructions.

A properly drained safe-tray under storage tank needs to be in place where any overflow or leakage may cause damage. Construction, installation and draining of a safe tray must comply with AS/NZS 3500.4.

It is recommended to not place combustible material on or adjacent to the water heater.

WARNING: The storage tanks can be very heavy when operational (i.e. filled with water) so the location of a tank installation must have the structural ability to support it.



*Solar return ports and heat exchange coil are available for units coupled with solar water heating.
*Element(s) and thermostat(s) are available for electric storage water heater units.

Figure 19

3.7.3. Circulation Pump Installation (Wilo RS 15/6)

The Wilo circulation pump provided is hot water rated, and required to circulate the water through the closed loop circuit. The circulating pump shall draw the water from the bottom section of the

heat exchanger and circulate this water through the solar collector before returning it to the top section of the heat exchanger. Refer to system diagrams in **Section 3.3. System Design** for the plumbing connection details. Water and water/food-grade glycol mixtures in a ratio up to 1:1 can be used with the pump. Contact Wilo or Choose Solar concerning the use of other fluids. Also see **Section 2.6. Freeze Protection** for more information.

The circulation pump is provided with a pump fitting kit of a flow indicator/control valve before and an isolating valve after the pump. This arrangement also avoids cavitation by having about 15 cm of straight plumbing at both ends of the pump.

WARNING: Only install the pump when the welding/soldering of the plumbing system is completed and any impurities within it have been flushed out. Foreign material, such as dirt, in the pipe system can cause damage to the pump.

NOTE: Choose Solar plumbing kit uses compression fittings which do not require welding or soldering.

3.7.3.1. Pump components

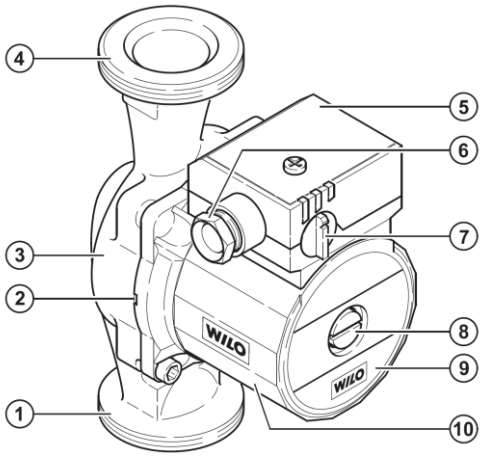


Figure 20

Table 4 Pump Components provides a list of items which corresponds to the numbered components of the pump in Figure 20 above.

Table 4 Pump Components

1	Suction joint	6	Cable entry
2	Condensate outlet	7	Speed switch
3	Pump housing	8	Ventilation
4	Pressure joint	9	Rating plate
5	Terminal box	10	Motor housing

3.7.3.2. Connection to plumbing system

When installing, please note that,

1. The pump (and pump controls) should be installed in an easily accessible position to facilitate future inspection or exchange.
2. It should be mounted in the correct orientation (See Figure 21 below) in the collector flow line as to avoid being stressed by the pipe-work.

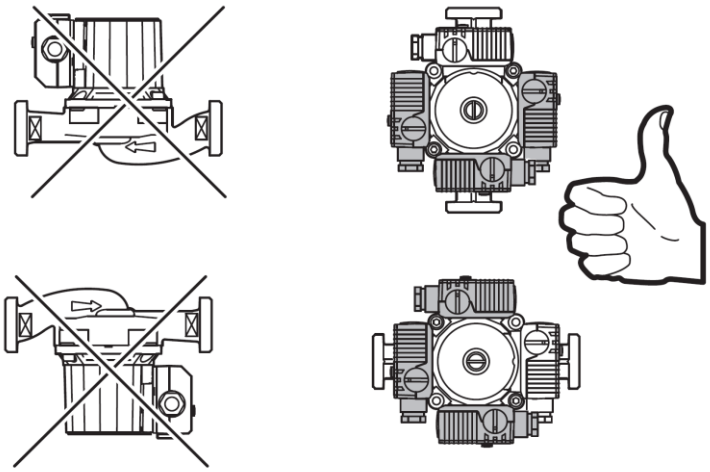


Figure 21

3. The direction of the flow must correspond with the arrow on the pump housing.
4. To avoid draining and refilling the whole system if the pump needs replacing, the pump kit comes with a flow control valve before and an isolating valve after the pump. These fittings also avoid any water from dripping onto the pump motor or terminal box.
5. When connecting the pump to the pipes, the pump can be secured against twisting using a spanner on key surfaces created for this purpose.
6. To obtain the correct terminal box position, loosen the motor fastening screws (Step A) and turn the motor housing (Step B) as shown in Figure 22 below.

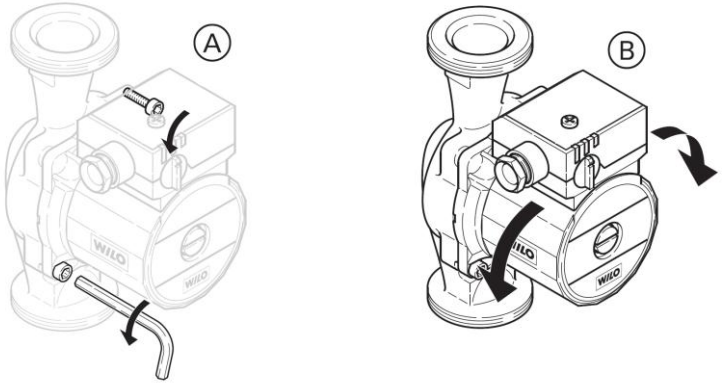


Figure 22

7. The flow rate of the pump needs to be calibrated to obtain optimal heat transfer while maintaining smooth flow in the solar collector, storage tank and pump loop.
    - The pump is equipped with a speed (rotary) switch in the terminal box for manual 3-speed control where 3 represents the lowest speed and 1 the highest. At 3, the speed is between 40-50% less than the maximum speed and also consumes about half the power to run.
    - The flow indicator provided as part of the pump kit provides visual indication of the flow rates to ease calibration.

WARNING: Be careful not to damage the housing gasket.

WARNING: When insulating the pump, only the pump housing may be insulated. The motor and condensation vents must not be blocked.

3.7.3.3. Electrical wiring

Electrical work **MUST** only be carried out by an authorised person such as a licensed electrician, in strict conformity to relevant electrical standards and regulations.

The installer must ensure that,

1. All wiring and switchgear comply with the relevant electrical standards and wiring regulations.
2. The pump must be connected to the power supply (i.e. system controller) using a wire equipped with a plug connection or a double pole switch. The required connections are shown in Figure 23.

   WARNING: The pump must be earthed in compliance to regulation.

3. The power supply cable should be of sufficient outer diameter to provide coverage at the cable entry in order to be protected from moisture and dripping water.
4. Cable leads should never come into contact with plumping system, pump or motor casing.
5. Heat resistant cables should be used as the water temperatures can rise above 90°C.
6. The supplied current and voltage are suitable as prescribed on the rating plate.
7. If terminal box is positioned sideways, the cable should always be inserted from below. See Figure 24.

NOTE: In the horizontal position, the connecting cable can be fed through the cable entry either to the left or right, whichever is more suitable. The blind plug and PG screwed joint can be swapped.

WARNING: The terminal box cover must be closed properly to avoid moisture entering which could cause short-circuits.

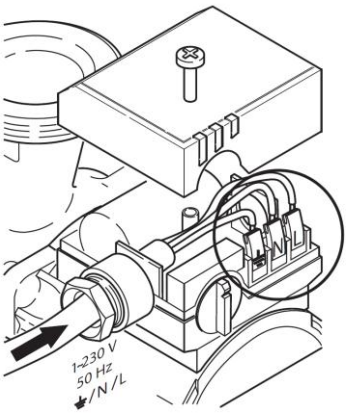


Figure 23

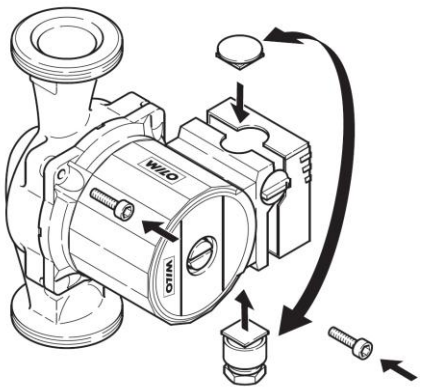


Figure 24

3.7.3.4. Operation

If there is air in the pump chamber, the pump will not pump water. There is an automatic air eliminator in the water heating system and the pump normally vents automatically after a short operational period. However, if the pump needs to be vented, please refer to Wilo's manual for venting instructions. Also see **Section 3.11.1. Filling Hot Water Storage** Tank for more information about system filling and venting.

WARNING: When/if loosening ventilation screw, do so with extra care as hot liquid or vapour may be released at high pressure.

3.7.4. Auxiliary Pump Installation — For RSD-B only (Wilo-Star Z 15)

For residential system design B (RSD-B) with an auxiliary pump (i.e. Wilo-Star Z 15), the water in the upper section of the tank is circulated through the gas heater to the residential water inlet in a separate loop.

As hot water rises and cold water sinks, the water being circulated in this loop from the upper tank is the warmer water resulting from the stratification effect in the tank. Instead of heating all the water in the storage tank starting from the cold water at the bottom, this pump circulates the usually warmer layer of water in the upper tank. This is a more efficient arrangement as it minimises both the amount of boosting required and the heating time.

When installing, make sure the pump is in the right position as shown in Figure 25 below. The arrow on the back of the housing indicates the direction of flow.

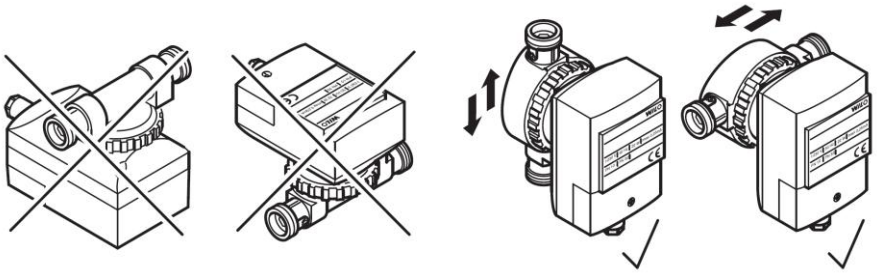


Figure 25

3.7.4.1. Electrical connection guidelines:

1. Install a cable with at 5–8 mm outside diameter with from the solar controller (i.e. H1 and ground terminals).
2. Open the connection box.
3. Guide the connecting cable through the cable entry and strip approximately 5 mm.
4. Secure the cores with the cable clips: L phase, N neutral, earth line (See Figure 26 below).
5. Tighten the cable connection firmly.
6. Close the connection box.

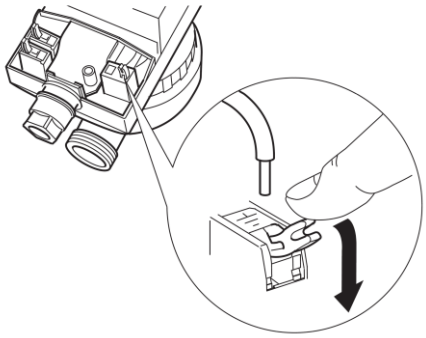


Figure 26

Please refer to the product manufacturer's manual provided for full installation, operation and maintenance instructions.

WARNING: Only an authorised person such as a licensed electrician can carry out electrical work.

3.8. Gas Booster Installation

Choose Solar supplies the Bosch Highflow gas heater as the instantaneous gas heater in its gas boosted systems (e.g. RSD-A Series). Refer to system diagrams in **Section 3.3. System Design** for the plumbing and gas connection details.

The heater must be installed firmly vertical to the floor without any inclination. The wall of which the gas heater is installed on must be able to bear a weight of the gas unit and fire-resistant (if possible) or otherwise heat insulated. A 50cm minimum distance is required around the four sides of the gas heater and no electrical wiring or appliances should be present above the unit. The orientation of the gas heater should also take account of future maintenance requirements.

WARNING: Do **NOT** connect gas heater flue exhaust to any public flue system which is intended for dispensing cooking smoke.

Refer to the manufacturer's installation and operation manual provided for complete installation instructions and other relevant information (e.g. safety reminders, troubleshooting, etc.) An illustration of the different parts of the gas heater is shown in Figure 27.

WARNING: The factory default operating temperature of the gas heater is set at 70°C and should not be altered as this is a requirement of AS 3498 for the Choose Solar water heating systems. **If it is not factory set at 70°C, it must be manually set.**

All requirements for consumer piping, flueing, ventilation and appliance installations which are associated with the use of fuel gases such as natural gas and liquefied petroleum gas (LPG) outlined in Australian Standard 5601 (AG 601) **MUST** be complied with.

WARNING: All safety measures set out by relevant Australian Standards and product manufacturer must be observed.

Figure 27

NOTE: It is recommended that the gas heater and gas supply is turned ON **only after** the solar water heating system is being commissioned.

3.9. Electrical Connection (For Electric Storage Water Heater)

Electrical work for electric storage water heater **MUST** only be carried out by an authorised person in accordance with AS/NZS 3000 Wiring Rules and any other relevant standards. The circuit isolation and fixed appliance regulations of the Wiring Rules must be complied with.

The Choose Solar electric water heaters are designed for 240 V AC supply only. The wiring diagram shown in Figure 28 in the following page and 3.10.3. Circuit Diagrams indicate the correct connection for the element(s) and thermostat(s). Connection for the element is made at the terminal location points under the weatherproof element covers.

Choose Solar electric water heaters are supplied with thermostats with manually re-settable over temperature thermal safety cut-outs.

The electric water heaters must operate with these devices being in place. Replacement should only be undertaken by an authorised person. The thermostat model numbers are noted in the wiring diagrams.

WARNING: The operation of the over temperature safety cut-out indicates a possibly dangerous situation. Do not reset the thermal cut-out until the water heater has been serviced by a qualified person.

3.9.0.1. Electric Storage Water Heater Thermostat Setting

The thermostat is normally factory set to 60°C. It should not be adjusted below this temperature.

In order to adjust the temperature setting (i.e. thermostats ST12 and ST13):

1) Disconnect the electrical power supply to the tank.
2) Remove the element cover.
3) Using a small flathead screw driver, rotate the thermostat to the appropriate temperature as indicated in Table 5 below.

Table 5 Thermostat(s) Settings

Thermostat	Model	Temperature Setting	Thermal Cut-out
For Solar Applications			
Top Thermostat (Thermostat 2)	ST13	70	70 Auto-reset
Bottom Thermostat (Thermostat 1)	ST12	60	90
For Non-Solar Applications (i.e. Standalone Water Heating)			
Top Thermostat (Thermostat 2)	ST13	70	70 Auto-reset
Bottom Thermostat (Thermostat 1)	ST12	60	90

WARNING: Electrical connections must only be carried out by an authorised person.

WARNING: The installer (e.g. licensed electrician) must ensure that the system is properly earthed.

WARNING: All safety measures set out by relevant Australian Standards and product manufacturer must be observed. A contactor is supplied to further protect the system.

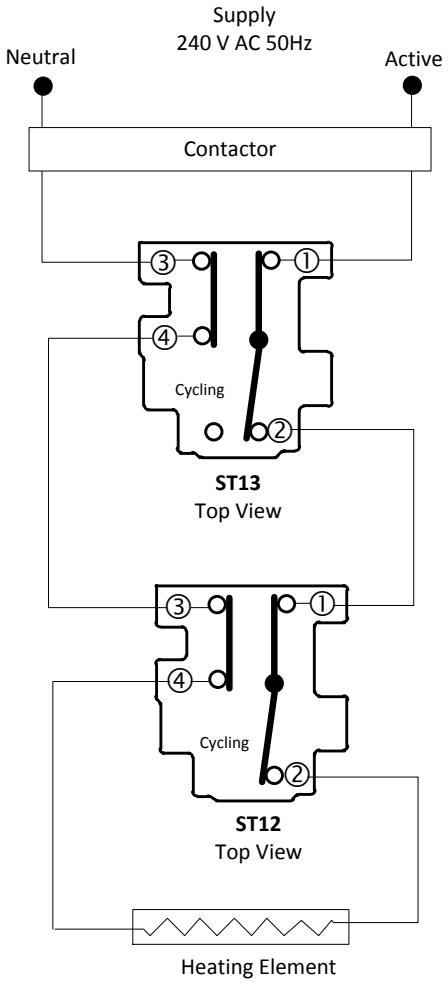


Figure 28

3.10. Controller Installation

Refer to **Section 3.10.3. Circuit Diagrams** for the recommended electrical circuit and also locate the best position for the system controller. The installer should already have planned out the best electrical routes during or after the initial site inspection, prior to carrying out the installation.

WARNING: Only an authorised person (e.g. qualified licensed electrician) can perform the electrical tasks.

3.10.1. System Controller

Choose Solar supplies an intelligent solar system controller which has multiple functions. Among its main functions are controlling the circulation pump as well as provide antifreeze and overheating protections. This controller also has the ability to switch between the main circulation pump and the auxiliary pump (in the case of Residential System Design B) to optimise solar contribution while minimising gas boosting, and meeting end-user hot water demand in all weather conditions.

The system controller should be placed indoors and away from any safety hazards as well as electromagnetic fields. For detailed installation, configuration and operating instructions please refer to the original manufacturer's manual provided.

WARNING: Make sure the temperature sensors and pump(s) are connected to the system controller before connecting the power supply.

WARNING: The system controller must be switched ON at all times to ensure the solar water heating system operates safely, efficiently and is protected (i.e. freeze protection operational).

3.10.2. Terminal Connection

The Choose Solar system controller comes with four sensor inputs where only two will be used with System Design A and three will be used for System Design B. Figure 29 below shows the terminal connection ports of the system controller and each of their corresponding functionalities are described in Table 6 to Table 9.

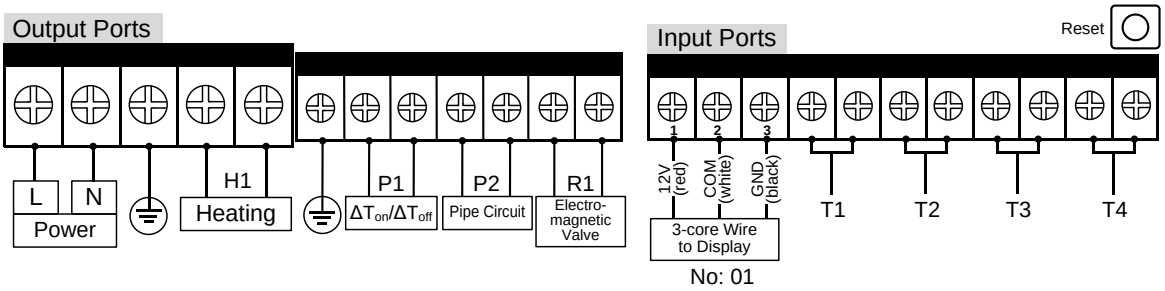


Figure 29

Table 6 Legend

Abbreviation	Function
T1	Input port of collector temperature sensor T1.
T2	Input port of tank temperature sensor T2, bottom.
T3	Input port of tank temperature sensor T3, above.
T4	Input port of hot water pipe temperature sensor, optional.
No:01	Connection port for display panel.
Power	Power input port.
⏚	Ground — Protective conducting wires (earth lines).
Heating	Output port of electrical heating, H1 (used for auxiliary pump instead).
$\Delta T_{on}/\Delta T_{off}$	Output port of temperature difference circulation pump P1.
Pipe Circuit	Output port of hot water pipe circulation pump P2.
Electromagnetic Valve	Used for the function of tank high temperature protection in systems with tanks which have two heat exchangers inside.
Reset	Restores factory default settings.

Table 7 Power Connection

Connection	Type	Description
Power	Power supply connection	Please note the type of power supply required from the type of label on the case of the device.
Ground ⏚	Earth line	The protective earth line must be connected.

Table 8 Input Ports

Input	Type	Description
T1	For Pt1000 sensors	For measuring the temperature of collector.
T2, T3, T4 (optional)	For NTC10K, B=3950 sensors	For measuring the temperature of tank or pipe.
No:01	3-core wire connected with display.	Do not modify this display.

3.10.2.1. Temperature Sensor Installation

It is strongly recommended that the temperature sensors supplied with the system controller be used. The Pt1000 temperature sensor is approved for use with solar collectors. A 1.5m all-weather resistant silicon cable is supplied with it. They are both temperature resistant up to 280°C.

The NTC10K, B=3950 temperature sensors are approved for use with tanks and pipes. It is equipped with 1.5m PVC cable and they are temperature resistant up to 105°C.

Please note that,

1. It is not necessary to distinguish the positive and negative polarity of the temperature sensor connections.
2. All sensor cables carry low voltages, and it is necessary to avoid inductive effects, so sensor cables should not be laid close to high voltage cables (minimum separation of 100mm) or otherwise adequately shielded.
3. Sensor cables may be extended to a maximum length of around 100 metres. When the cable length is up to 50m, 0.75mm^2 cables should be used. When the cable length is up to 100m, 1.5mm^2 cables should be used.
4. Before installing the sensors into the solar water heating system (e.g. header, tank, etc.), make sure the temperature probe ports are free of moisture. After which, the probe should be coated with a thin layer of thermal paste (if applicable) and attached to the port firmly. If the fit is too loose, add a piece of copper or stainless steel to reinforce the contact.
5. Insulators and silicon sealant can be used to prevent water entering the contact area, protect the sensor and maintain accurate and consistent temperature readings.

WARNING: Do not run the sensor cables underneath the pipe insulation alongside the copper pipe, particularly when the extended cable is not resistant to high temperatures. Run along the pipe outside its insulation and secure the cables with UV resistant cable fasteners at every 15-20cm. It is recommended that the sensor cables be insulated as well.

Table 9 Output Ports

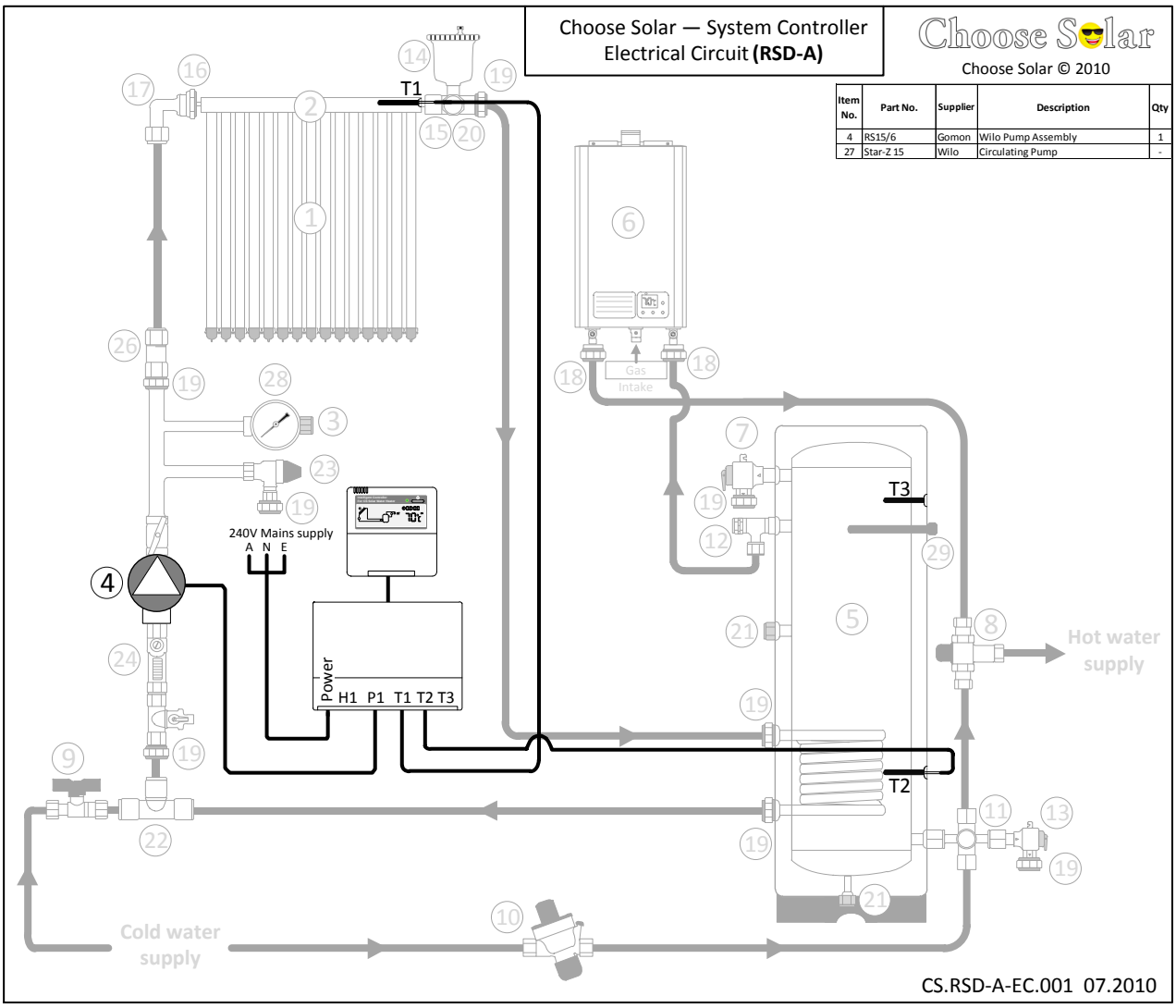
Output	Maximum Switching Current	Type	Description
P1, P2	5A	Electromagnetic relay	For circulation pump(s).
H1	16A	Electromagnetic relay	For electrical heating **or auxiliary pump**.
R1	5A	Electromagnetic valve	For high temperature protection function.

Please refer to the electrical circuit diagrams in the following section for the recommended connections from the system controller terminals to the solar water heating system. Not all ports in the system controller will be used and please note that every port can only connect to a single cable.

NOTE: In Design B, H1 is connected to the auxiliary pump because the pump performs a heating function. It does so by circulating the hot water from the instantaneous gas booster output, which is at 70°C back into the upper part of the storage tank to heat that portion of water up to 60°C. See **Section 3.7.4. Auxiliary Pump Installation — For RSD-B only** for more information about thermal stratification in water.

3.10.3. Circuit Diagrams

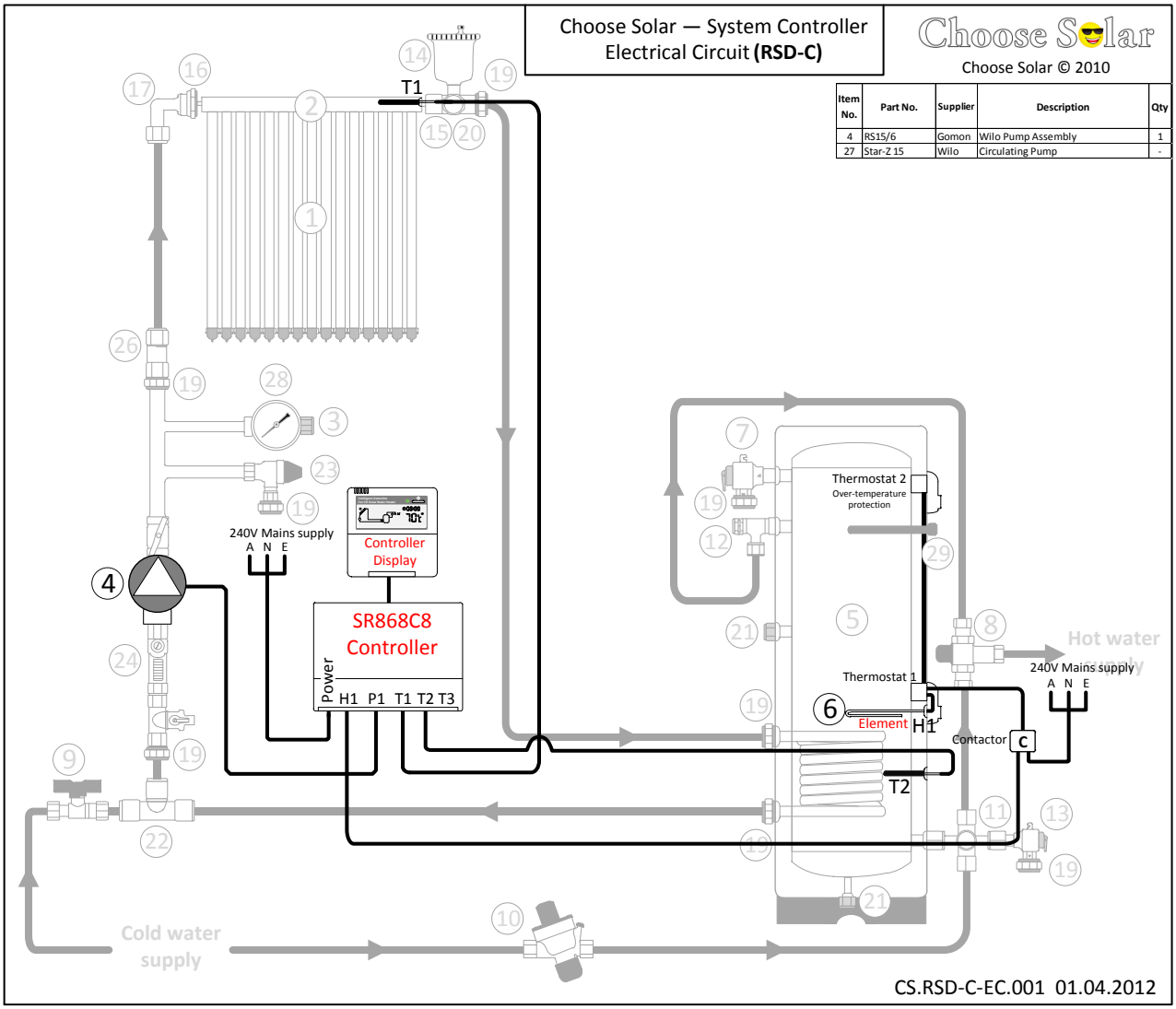
3.10.3.1. Choose Solar — Residential System Design A (RSD-A)



3.10.3.2. Choose Solar — Residential System Design B (RSD-B)

Check with Choose Solar regarding RSD-B's circuit diagram.

3.10.3.3. Choose Solar — Residential System Design C (RSD-C)



3.10.4. Programming System Controller

When the controller is started up, the time and week need to be set, followed by a choice of system operation. For detailed installation, configuration and operating instructions please refer to the original manufacturer's manual provided. The system controller interface is shown in Figure 30 below.

The controller setting for Residential System Design A (RSD-A) corresponds to the "1 Collector array – 1 Storage tank – 1 Pump" setting in the manufacturer's manual.

The controller setting for Residential System Design B with auxiliary pump (RSD-B) corresponds to the "1 Collector array – 1 Storage tank – 1 Pump (2sensors on tank)" setting in the manual. However, please note that the auxiliary pump (i.e. labelled P2) will **NOT** be connected to the P2 terminal on the system controller but H1 (i.e. heating terminal). Please refer to circuit diagram of RSD-B in **Section 3.10.3. Circuit Diagrams**.

The auxiliary pump functions like a heating device (See **Section 3.7.4. Auxiliary Pump Installation** — For RSD-B only (Wilo-Star Z 15)) and should be set to operate during peak water usage (i.e. Evening) if temperature is below 60°C. For other settings, follow the instructions in the "Operation Instruction" manual supplied by the manufacturer.

The controller setting for Residential System Design C (RSD-C) corresponds to the "1 Collector array – 1 Storage tank – 1 Pump and Auxiliary Heating" setting in the manufacturer's manual.

WARNING: Deviating from the instructions provided in the manufacturer's manual could adversely affect solar performance.

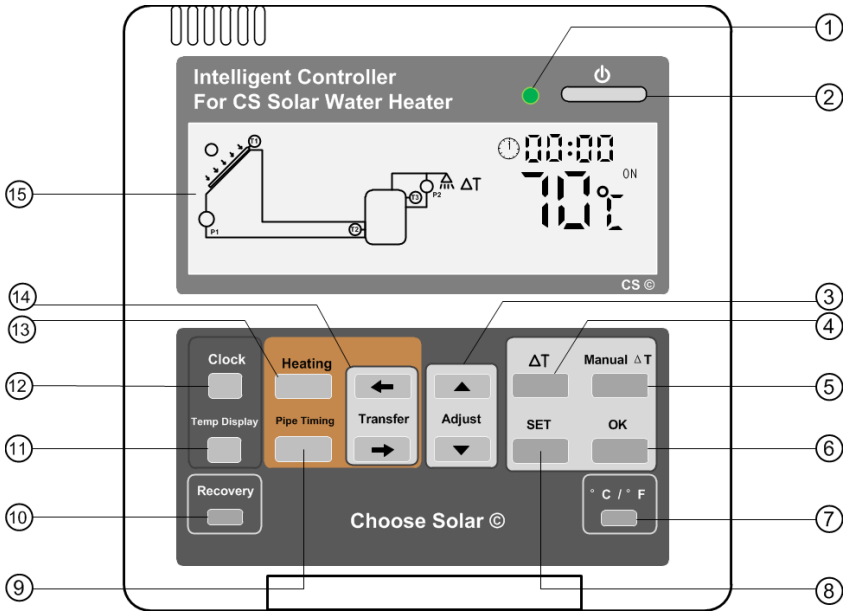


Figure 30

Item	Button on display panel	Description
1	Green LED	Power indication lamp.
2	On/Off	Power button.
3	▲▼Adjust	Adjusting buttons.
4	ΔT	To set switch on/off temperature difference of solar circulation.
	Manual ΔT	Manual commissioning to trigger temperature difference controlled solar circulation.
6	OK	Activate/Deactivate one function.
7	°C / F	Celsius / Fahrenheit transformation button.
8	SET	
9	Pipe timing	To set time for hot water pipe circulation.
10	Recovery	To recover the display to factory set mode.
11	Temp. Display	Display temperature in different position one by one.
12	Clock	Set Clock.
13	Heating	Electrical heating time set.
14	←→Transfer	Transfer button.
15		LCD display screen

3.11. System Commissioning

Start up the solar water heating system by first filling the storage tank according to the procedure on the next page, followed by commissioning of other components.

3.11.1. Filling Hot Water Storage Tank

Fill the storage tank with water when the inlet and outlet pipes are connected to the plumbing system. The collector loop must be filled with water and air purged prior to the vacuum tubes being installed.

1. Open the cold water supply valve to fill the tank, gently operate the PTR valve release lever to expel air. Close this valve once steady water is expelled.
2. The closed loop circuit of the solar heating circuit has an automatic air eliminator valve fitted to the manifold/header which will expel the air from this circuit. The pump should be run at its highest speed to assist the expulsion of air.
3. After the unit has been commissioned the drain valve handle should be removed to prevent tampering or inadvertent draining of the system.
4. Readjust the speed of circulation pump to provide the appropriate flow rate for the system.
5. Only after the plumbing has been confirmed as leak free for both circuits and the hot water storage tank is filled should the heat tubes be installed.

NOTE: The circulation pump can be turned ON manually using the system controller. Refer to the manufacturer's manual for instructions.

3.11.2. Gas Booster

Gas supply and power to the gas booster may now be turned ON after the storage tank is filled with water and the heater connections have been checked for any leaks.

3.11.3. System Controller

Ensure that the correct system controller settings are set for the system design chosen and the controller is fully operational. Check controller operation again once the vacuum tubes are installed.

3.12. Vacuum Tube Installation

The vacuum tubes and heat pipes should only be installed when the plumbing is completed, heat exchange circuit and the storage tank are filled with water and, when the circulation pump and system controller are operational.

The vacuum tubes with the heat pipes should not have been exposed to sunlight prior to their installation. The following are instructions for the installation:

1. Always start by coating the tip of the heat pipe with a thin layer of the thermal paste and lubricate the top outer surface of the vacuum tube with a small amount of silicon spray to allow it to slip through the manifold rubber ring seal.

NOTE: Applying the thermal paste ensures that both the heat pipe and header port will be in close contact to ensure good heat transfer.

2. Hold firmly at about mid-length and guide the heat pipe tip pass the rubber seal and into the manifold port. A bit of force needs to be exerted upward with slight left and right twisting action.

The heat pipe and vacuum tube are fully inserted once the black coating of the vacuum tube has disappeared up into the manifold and the bottom of the tube sits correctly in the bottom locking cap.

3. Follow the following instructions for securing the SHCMV tubes.

Maintain the position of the vacuum tube which is inserted into the header with slight upward force. The bottom end of SHCMV tube shall be supported by the protecting cap and secured by tightening the adjustable bolt. No 'up-and-down' movement space is allowed. When the tube is secured, the tube cap shall be "locked" by snapping into the two side pockets. See Figure 31 below.

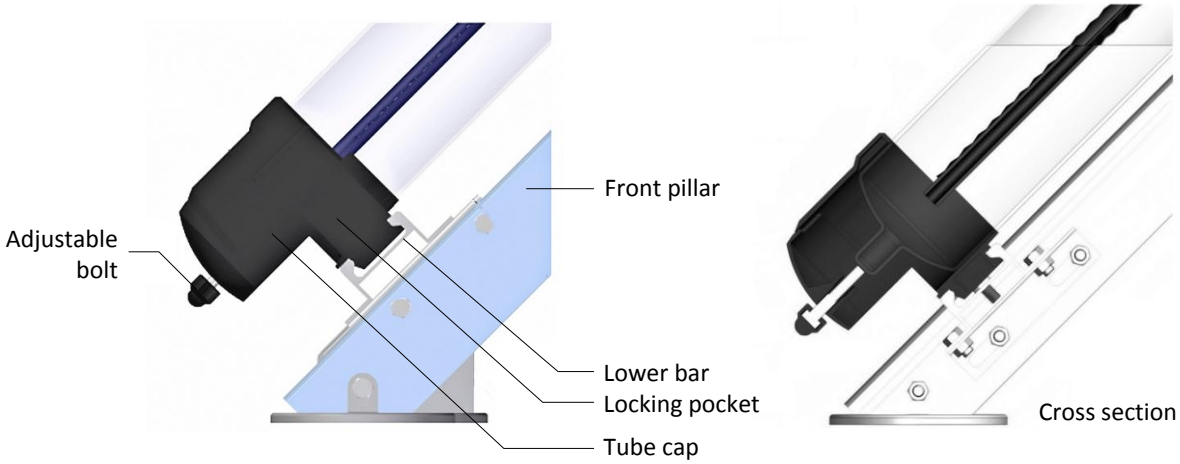


Figure 31

4. After installing the vacuum tubes, go through all of them to see if any of them is visibly dirty. If so, clean the tube using liquid glass cleaner with cloth or paper.

When the vacuum tube installation is complete, follow the post installation procedures to make sure the entire solar water heating system is complete and operational.

3.13. Post Installation

Choose Solar strongly recommend the following processes to ensure ease of follow up in the future, if required.

3.13.1. Complete Checklists

Ensure that all the items in the system installation checklist are accounted for. **The installation checklist forms part of the installation record and is located at the rear of this manual.** Some components such as the gas heater have their own installation checklist in their respective manufacturer's manuals. Make sure they have also been checked.

3.13.2. Check Solar Water Heater Operation

When the solar collectors are installed, they will begin to produce heat after 2 to 10 minutes, depending on the insolation at the time. Check the system controller and pump for correct operation and adjust settings as required.

3.13.3. Take Photographs

a) Always take photos of the solar water heating installation, particularly the solar collectors on the roof, as record. These will serve as useful and important records if you ever receive a phone call from the owner about the installation. These photos may also be required by the Regulator or relevant authorities during system audits.

b) Send a copy of **ALL** installation photos to Choose Solar as a record of the installation and for the warranty of the products to be valid. If your installation shows exceptional workmanship, your photos may be advertised on the Choose Solar website to promote your work. See next section for contact information.

3.13.4. Complete Installation Record and Warranty Forms

Complete the triplicate installation record and warranty form, which is at the rear of this manual and also available from Choose Solar. The form should be completed with the original and a copy left with the owner, and a copy retained by the installer. The owner is required to fax, mail or email the original copy to Choose Solar's address on the warranty form.

4. Maintenance and Service Calls

Regular maintenance of the solar water heater will ensure uninterrupted, optimal performance. This usually begins with general observations of the water heating system followed by service calls (if required) and scheduled maintenance services.

4.1. General Observations

If you are experiencing a lack of hot water or suspect there may be some irregularities,

	Observations:	**Normal Condition**
1.	Is your hot water consumption level unchanged?	Yes
2.	Is the system controller switched ON?	Yes
3.	Is the gas booster switched ON?	Yes
4.	Does the gas meter speed up when the booster is switched ON?	Yes
5.	Have nearby trees overgrown to cause shading?	No
6.	Are any leaks within the plumbing system observed (Visual check only)?	No
7.	Are there any broken glass detected near the solar collectors?	No
8.	Is your area constantly exposed to freezing conditions?	No
9.	Is your area constantly experiencing power failures?	No

When you have answered all the questions above and one or more item(s) is causing concern, contact the installer of the system or an authorised person to discuss and/or organise a service visit.

If all the above turn out to be in their normal condition, then the following procedures may apply:

- **Cleaning**
  Regular rain should keep the collector tubes clean, however if they have become dirty they may be cleaned carefully with warm soapy water and a clean dry cloth **ONLY IF** they are safely accessible. Otherwise, the installer of the system or another suitably qualified person must be contacted to carry out the task.
- **Leaves**
  During autumn, leaves may collect under or between the collector tubes. These should be removed to ensure efficient operation of your solar system. The same warning above applies.

WARNING: The end-user must **NOT** climb onto roof or other dangerous location to perform any of these tasks. All health and safety regulations must be adhered to.

- **Broken tubes**
  If a severe storm occurs or a tree branch falls on the solar collectors, it is possible for tubes to be broken. The collector tubes are made out of glass so care must be taken to clean up any glass that may have fallen from the roof to prevent injury. The end-user should immediately contact an authorised person to clean the broken glass on the roof and the damaged collector tube(s) replaced. This will ensure that the safe and efficient operation of your system is maintained.

Installer guidelines for broken tubes:

1. If a tube is broken it should be replaced as soon as possible to maintain maximum collector performance.
2. The system will still operate normally and safely even with a tube broken but at reduced performance.
3. Any broken glass should be cleared away to prevent injury.

WARNING: Always wear safety gloves and glasses when handling vacuum tubes and heat pipes.

4. To replace broken tube(s):
    I. Remove the tube cap(s), slide broken tube out and carefully pick up any glass pieces. **Protective gloves must be worn when handling broken glass.**
    II. Avoid touching the glass wool insulation inside the manifold with bare hands, as it can cause mild skin irritation.
    III. All broken tubes need to be fully replaced.

WARNING: Tube replacements must only be done by an authorised person(s) such as the original installer.

4.2. Prolonged System Idle

If the hot water system is not used for two weeks (or more), a quantity of hydrogen gas, which is highly flammable, may accumulate in the water heater. To dissipate this gas safely, it is recommended that a hot tap be turned on for several minutes at a sink, basin, or bath, but not at a dishwasher, clothes washer, or other appliance. During this procedure, there must be no smoking, open flame, or any electrical appliance operating nearby. If hydrogen is discharged through the tap, it will probably make an unusual sound as with air escaping.

4.3. Six Monthly Service

It is recommended that the PTR valve be operated once every 6 months to maintain reliability of the water heating system.

WARNING: It is important to lift the lever gently and be careful of the water that is being discharged as it can be very **HOT**.

This procedure may be carried out by the end-user provided that it is done with all relevant occupational health and safety regulations met. If in doubt, contact your installer or an authorised person.

4.4. Major Service

A major service can ONLY be carried out by an authorised person and is performed every 5 to 7 years, or as required. The frequency of this service depends on conditions such as water quality and weather. Some typical procedures that may be carried out include, but not limited to the following:

1. Replace the Pressure Temperature Relief (PTR) valve.
2. Protective anode replacement.
3. Check heat transfer liquids (e.g. antifreeze).

4. Go through the whole water heating system and identify potential problems (e.g. broken tubes, shading issues, frame integrity, etc.)
5. Inspect all connections (e.g. plumbing leaks, insulation damage, etc.)

NOTE: It is recommended that Choose Solar be consulted regarding any replacement of components (e.g. anodes).

4.4.1. Draining the Hot Water Tank

In the event of the hot water tank needing to be serviced, relocated or replaced, the water in it must first be drained.

WARNING: This operation must only be done by an authorised person (e.g. qualified plumber). Beware of hot water.

In order to drain the hot water tank,

1. Turn off the cold water supply
2. Release the pressure in the tank by operating the Pressure Temperature Relief (PTR) valve release lever.
3. Disconnect the heater coil circuit, if not being reconnected that day, cover collector tubes to prevent overheating.
4. Undo the cold water union, attach a hose to the heater side of the union, and direct the hose to a safe drainage location.
5. Operate the PTR valve release lever to allow air into the tank to prevent a vacuum being formed.
6. When all water is drained, ensure that the release lever returns to the normal closed position and refasten all fittings.

4.4.2. Insulation

Proper insulation will minimise any heat lost through the plumbing and maintain good efficiency of the system. During maintenance, check for the following:

1. The plumbing pipes running to and from the solar collector should be well insulated and checked once every few years.
2. For any insulation exposed to sunlight, ensure any protective layer is in good condition, replacing as required.
3. Choose solar has customised insulators for the valves and fittings as supplied with the Choose Solar plumbing kits. These replacements can be obtained from Choose Solar as required.

4.4.3. Other Components

Other parts of the system such as the system controller, circulation pump, gas heater and storage tank should be inspected and/or serviced according to their manufacturer's own maintenance guidelines.

5. Troubleshooting

Below is a guide to troubleshooting some of the common issues or problems which may occur with solar water heaters. Only authorised person(s) can inspect and repair the solar water heater installation. If you have any queries regarding any of the following issues, please contact your local Choose Solar retailer.

Issue	Possible cause(s)	Solution(s)
1. Not enough hot water.	Gas booster is not configured properly.	Make sure gas booster is operational. Check manufacturer's manual for troubleshooting procedure.
	Damaged tubes.	Check the vacuum tubes and replace as required.
2. Pump always running.	Insufficient flow rate.	Change the pump to higher speed setting.
3. Pump continuingly starts and stops.	Flow rate too high.	Change the pump to lower speed setting.
4. Pump not running.	Power supply failure	Check system controller power output to pump.
	Solar collector sensor faulty or not inserted properly.	Check temperature probe in collector port, reapply thermal paste and reaffix, replacing as required.
5. Pump running at night.	Freeze protection in operation.	It is normal in cold weather that this happens. If it occurs regularly, more insulation is required.
	Storage tank sensor faulty.	Check temperature probe in storage tank port, reapply thermal paste and reaffix, replacing as required.
6. Pressure Temperature Relief (PTR) valve continuously vents water.	Faulty PTR valve.	Replace PTR valve.
	Too much hot water is being produced.	Check temperature setting in system controller and the temperature probe in storage tank.
	Mains pressure is too high.	Check Pressure Limiting Valve in water supply line is set at 500kPa.
7. Minimal solar water heating.	Vacuum tubes not installed correctly.	Make sure thermal paste is applied liberally to the tip of the vacuum tubes before inserting into header. Check that the tubes are fully inserted and secured.
	Damaged tubes.	Check the vacuum tubes and replace as required.
	Damaged insulation.	Check the condition of the insulation and replace as required.

6. Safety Reminders

It is very important that the water heating system is safe for operation and also that the installation is carried out in a safely manner. Throughout this manual, NOTE(S) and WARNING(S) are outlined. Below is a brief summary of the key safety reminders:

1. Installation must be completed in accordance with the requirements of AS/NZS 3500, AS5601 (AG601) and any other relevant standards and regulations.
2. Installation must be completed or inspected by an authorised person.
3. The authorised person(s) is responsible for his/her/their own safety at all times.
4. Ensure the roof construction allows for fitment of solar collectors.
5. Installers must adhere to all the requirements of Occupational Health & Safety and other relevant regulations. This includes safety regulations regarding working on roofs (or at a height).
6. Always wear safety glasses when handling vacuum tubes.
7. Wear leather gloves when handling metal components.
8. Wear thick leather gloves if handling hot heat pipes and vacuum tubes.
9. When flushing out accumulated hydrogen after prolonged idling time of the water heating system, make sure the area where this operation is carried out is well ventilated and do not ignite anything (e.g. cigarette, stove, etc.) close by.
10. All safety reminders and relevant regulations regarding the water heating system also need to be adhered to by the end-user whenever applicable.

7. Warranty

The system must be installed by a qualified person (i.e. licensed plumber, gas fitter and/or electrician) in accordance with all installation instructions, relevant statutory and local requirements of the state or territory in which the system is installed.

Warranty is limited to the replacement or repair, at the option of Choose Solar of any defective product and of such components that have been damaged as a consequence of the defect. Choose Solar is excluded to the extent allowable by Law from responsibility for any consequential loss including : 1. Personal injury, 2. Economic loss, 3. Property damage, 4. Pain and suffering, 5. Any legal or other damages flowing from any manufacturing fault or defect.

This warranty only applies to the solar system/gas water heater product and does not apply to any additional electrical and/or plumbing parts supplied by the installer or components of an existing installation. Please refer to the documentation provided with those products for their respective, complete warranty details.

The installer of the Choose Solar solar water heating system MUST provide the owner of the solar water heater will 2 copies of the completed installation and warranty record form. In order to register the system for warranty purposes, the owner must send the original form to:

Fax: 03 9720 7582
Post to: Choose Solar Pty Ltd
17 Gatwick Road
Bayswater North Vic 3153.
Email: info@drillmate.com.au

Choose Solar are at no obligation to return parts replaced at its option pursuant to this warranty.
For installations outside of the boundaries of the capital city metropolitan areas, the cost of transport, insurance and travelling will be charged to the owner.

7.1. Warranty Exclusions

Warranty will be null and void and charges may be incurred, including a service and parts charge if any of the following exclusions exist:

1. Where service is required to rectify problems with abnormal water supply (e.g. high water pressure, negative pressure, excessive temperature, corrosive atmosphere), faulty gas fitting, plumbing and/or electrical wiring or major variations in gas or electricity supplies.
2. If the system is sold, repaired or altered by any third party without the written consent of Choose Solar.
3. Claims for damage to walls, foundations (outside), furnishings (inside), roofs or other losses, directly or indirectly due to leakage from the water heater.
4. Where the system has been drained for a period without the solar tube collector being covered, resulting in damage to the collector.
5. Accidental breakage and acts of God are not covered by this warranty, and should be added to your general household insurance policy.

6. Where water levels outlined in the water quality requirements are exceeded or from the use of bore water, highly mineralized water or such as described in **Section 2.4. Water Quality**. Sludge deposits are also excluded from Choose Solar's warranty.
7. Incorrect installation or misuse is not covered by Choose Solar. This includes the attachment to the roof of the collector and the support of the storage tank.
8. Breakage or damage of components, especially heat tubes during transport and/or installation is excluded from warranty by Choose Solar.

The benefits conferred by this warranty are in addition to all other rights and remedies in respect of the product, which the purchaser has under the Trade Practices Act (Commonwealth) 1975, and similar State or Territory laws.

7.2. Warranty Coverage

Manufacturing fault of parts and/or workmanship will be replaced if components are found faulty or have failed without any cost to the customer (within metropolitan areas) within the "Labour and Parts" warranty period. After which only replacement products will be provided to the customer up to the expiry of the "Parts Only" warranty period where additional costs incurred will be charged to the customer.

Component	Labour and Parts	Parts Only
Collector Tubes	One year	Ten years
Collector Header/Manifold	One year	Fifteen years
Circulation Pump	One year	Five years
System Controller	One year	Five years
Bosch Gas Heater	One year	One year
Gomon Gas Heater	One year	One year
Stainless Steel Tank	One year	Ten years
Choose Solar Mounting Frame	One year	Fifteen years

Please note that there may be a separate fee (e.g. transport, insurance, etc.) chargeable to the customer for installations outside the boundaries of capital city metropolitan areas.

8. Disclaimer

Choose Solar (Drillmate Pty Ltd) withholds the right to change dimensions and the characteristics of its products without any forewarning, and rejects any kind of responsibility for misprints.

This installation and user's manual is only a guide and as such, Choose Solar Pty Ltd and/or Drillmate Pty Ltd will not be held responsible for any damage to person or property that results during the installation or subsequent use of this solar collector and related system components.

Information contained in this manual is correct at the time of its printing. It is subject to updates and changes at the discretion of Choose Solar.

8.1. Scope of Manual

This manual provides important information about the safe installation and operation of the Choose Solar water heating systems. However, this manual is not intended to be a complete reference for the installation and safety procedure of installing and operating the water heating system.

The detailed instructions for the installation, operation and maintenance of the complete solar water heating equipment including, but not limited to storage tank, gas booster, circulation pump, system controller, valves and other plumbing components are provided separately in their respective manufacturers' product manuals and must also be followed. Only authorised person(s) with proper training are allowed to carry out the installation and/or related work.

The Choose Solar water heating system designs in **Section 3.3. System Design** which are AS/NZS2712:2007 approved system designs should not be altered. Any deviation from these system designs may not be eligible for government or state rebates (in Australia). Any customised system designs should be validated by a qualified engineer, and, inspected and approved before commissioning.

Choose Solar

INSTALLATION REPORT & WARRANTY FORM (Customer's Copy)

CUSTOMER

Name: ……..
Installation address:……
Suburb:……State:……Postcode:…….
Phone: ……Fax:……..
Mobile……
Email: ……..

Company:……..……..(Purchased from)
Invoice No: ……..

INSTALLER

Installation Date:……(DD/MM/YYYY)
Plumber:……..……Licence No: …….
Phone/Mobile……..……
Address:……Suburb:……
State:……..Postcode:…….
Electrician:……..…Licence No: ……
Phone/Mobile……..……
Address:……Suburb:……
State:……..Postcode:…….
Choose Solar Invoice No:……..

Choose Solar System Model:……..…Serial No:…..……
System Type: Gas ☐ Electric ☐ (☑Tick appropriate)
Tank Model: ……Serial No:…..……...
Gas Booster Model:……Serial No:……..……

Collector Model: ……Serial No:…..……...
Controller Model: ……..…Serial No:……..……

INSTALLATION CHECKLIST

1.	Solar collectors face as close to north as possible.	YES/NO
2.	Solar collectors are not significantly shaded between 9 am and 3 pm.	YES/NO
3.	Solar collectors are not likely to be struck by falling objects such as branches or other nearby objects.	YES/NO
4.	Solar collectors are installed at an angle of between 20º - 80º, preferably at latitude angle or higher.	YES/NO
5.	In areas prone to large hail (above 35mm), collector is installed at an angle of 45º or greater.	YES/NO
6.	Frame is secured to structurally sound roof/wall.	YES/NO
7.	No leaks are observed in plumbing.	YES/NO
8.	Plumbing pipe runs are well insulated.	YES/NO
9.	Exterior insulation is protected against sunlight with foil wrap or equivalent.	YES/NO
10.	Heating/Heat exchange circuit and lines to heater and tempering valve are all 15mm copper (no plastic olives used).	YES/NO
11.	Functional checks for controller and pump have been completed.	YES/NO
12.	Pressure relief, Pressure Temperature Relief and Expansion Control valves must have dedicated drain pipes which will discharge only into high temperature resistant drains and will not pose any dangers.	YES/NO
13.	Pump, controller and all electrical connections are protected from water ingress.	YES/NO
14.	Vacuum tubes are clean or have been cleaned.	YES/NO
15.	The basic operation of the collector has been explained to the end-user.	YES/NO
16.	Water quality has been checked.	YES/NO
17.	A copy of the Installation and User manual is provided to the customer.	YES/NO
18.	Installation Report and Warranty Form has been completed with two copies including the original left with the customer. A copy is retained by the installer, the second copy sent to Choose Solar with photos of installation work.	YES/NO

Individual components may have their own manufacturer's installation checklists (e.g. Gas Heater) which must be checked as well. All items should be marked for the installation to be considered complete and satisfactory.

IMPORTANT: The above checklist is only intended to serve as a guide. There may be site specific installation procedures not included on this list. Installation of the Choose Solar water heating systems must be carried out in accordance to all applicable Standards and Regulations by qualified tradesperson(s) who hold relevant industry licenses or certificates required for completing the installation and/or related work. Warranty is covered under the terms and conditions outlined in the Warranty section in the Choose Solar™ Solar Water Heater Installation and User Manual.

ADDITIONAL COMMENTS:

Customer to retain this copy of form.

Choose Solar

INSTALLATION REPORT & WARRANTY FORM (Installer's Copy)

CUSTOMER

Name: ……..
Installation address:……
Suburb:……State:……Postcode:…….
Phone: ……Fax:……..
Mobile……
Email: ……..

Company:……..……..(Purchased from)
Invoice No: ……..

INSTALLER

Installation Date:……(DD/MM/YYYY)
Plumber:……..……Licence No: ……
Phone/Mobile……..……
Address:……Suburb:……
State:……..Postcode:…….
Electrician:……..…Licence No: ……
Phone/Mobile……..……
Address:……Suburb:……
State:……..Postcode:…….
Choose Solar Invoice No:……..

Choose Solar System Model:……..…Serial No:…..…..……

System Type: Gas ☐ Electric ☐ (☑Tick appropriate)

Tank Model: ……Serial No:…..……..……...

Gas Booster Model:……Serial No:……..……

Collector Model: ……Serial No:……..……...

Controller Model: ……..…Serial No:……..……

INSTALLATION CHECKLIST

1.	Solar collectors face as close to north as possible.	YES/NO
2.	Solar collectors are not significantly shaded between 9 am and 3 pm.	YES/NO
3.	Solar collectors are not likely to be struck by falling objects such as branches or other nearby objects.	YES/NO
4.	Solar collectors are installed at an angle of between 20º - 80º, preferably at latitude angle or higher.	YES/NO
5.	In areas prone to large hail (above 35mm), collector is installed at an angle of 45º or greater.	YES/NO
6.	Frame is secured to structurally sound roof/wall.	YES/NO
7.	No leaks are observed in plumbing.	YES/NO
8.	Plumbing pipe runs are well insulated.	YES/NO
9.	Exterior insulation is protected against sunlight with foil wrap or equivalent.	YES/NO
10.	Heating/Heat exchange circuit and lines to heater and tempering valve are all 15mm copper (no plastic olives used).	YES/NO
11.	Functional checks for controller and pump have been completed.	YES/NO
12.	Pressure relief, Pressure Temperature Relief and Expansion Control valves must have dedicated drain pipes which will discharge only into high temperature resistant drains and will not pose any dangers.	YES/NO
13.	Pump, controller and all electrical connections are protected from water ingress.	YES/NO
14.	Vacuum tubes are clean or have been cleaned.	YES/NO
15.	The basic operation of the collector has been explained to the end-user.	YES/NO
16.	Water quality has been checked.	YES/NO
17.	A copy of the Installation and User manual is provided to the customer.	YES/NO
18.	Installation Report and Warranty Form has been completed with two copies including the original left with the customer. A copy is retained by the installer, the second copy sent to Choose Solar with photos of installation work.	YES/NO

Individual components may have their own manufacturer's installation checklists (e.g. Gas Heater) which must be checked as well. All items should be marked for the installation to be considered complete and satisfactory.

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ADDITIONAL COMMENTS:

Installer to retain this copy of form.

Choose Solar

INSTALLATION REPORT & WARRANTY FORM (Choose Solar's Copy)

CUSTOMER

Name: ……..
Installation address:……
Suburb:……State:……Postcode:……..
Phone: ……Fax:……..
Mobile……
Email: ……..

Company:……..……..(Purchased from)
Invoice No: ……..

INSTALLER

Installation Date:……(DD/MM/YYYY)
Plumber:……..……Licence No: ……
Phone/Mobile……..……
Address:……Suburb:……
State:……..Postcode:…….
Electrician:……..…Licence No: ……
Phone/Mobile……..……
Address:……Suburb:……
State:……..Postcode:…….
Choose Solar Invoice No:……..

Choose Solar System Model:……..…Serial No:…..…..……

System Type: Gas ☐ Electric ☐ (☑Tick appropriate)

Tank Model: ……Serial No:…..……...

Gas Booster Model:……Serial No:…..……

Collector Model: ……Serial No:……..……...

Controller Model: ……..…Serial No:……..……

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3.	Solar collectors are not likely to be struck by falling objects such as branches or other nearby objects.	YES/NO
4.	Solar collectors are installed at an angle of between 20º - 80º, preferably at latitude angle or higher.	YES/NO
5.	In areas prone to large hail (above 35mm), collector is installed at an angle of 45º or greater.	YES/NO
6.	Frame is secured to structurally sound roof/wall.	YES/NO
7.	No leaks are observed in plumbing.	YES/NO
8.	Plumbing pipe runs are well insulated.	YES/NO
9.	Exterior insulation is protected against sunlight with foil wrap or equivalent.	YES/NO
10.	Heating/Heat exchange circuit and lines to heater and tempering valve are all 15mm copper (no plastic olives used).	YES/NO
11.	Functional checks for controller and pump have been completed.	YES/NO
12.	Pressure relief, Pressure Temperature Relief and Expansion Control valves must have dedicated drain pipes which will discharge only into high temperature resistant drains and will not pose any dangers.	YES/NO
13.	Pump, controller and all electrical connections are protected from water ingress.	YES/NO
14.	Vacuum tubes are clean or have been cleaned.	YES/NO
15.	The basic operation of the collector has been explained to the end-user.	YES/NO
16.	Water quality has been checked.	YES/NO
17.	A copy of the Installation and User manual is provided to the customer.	YES/NO
18.	Installation Report and Warranty Form has been completed with two copies including the original left with the customer. A copy is retained by the installer, the second copy sent to Choose Solar with photos of installation work.	YES/NO

Individual components may have their own manufacturer's installation checklists (e.g. Gas Heater) which must be checked as well. All items should be marked for the installation to be considered complete and satisfactory.

IMPORTANT: The above checklist is only intended to serve as a guide. There may be site specific installation procedures not included on this list. Installation of the Choose Solar water heating systems must be carried out in accordance to all applicable Standards and Regulations by qualified tradesperson(s) who hold relevant industry licenses or certificates required for completing the installation and/or related work. Warranty is covered under the terms and conditions outlined in the Warranty section in the Choose Solar™ Solar Water Heater Installation and User Manual.

ADDITIONAL COMMENTS:

Please complete and return this form **immediately after installation to**:

Choose Solar Pty Ltd
17 Gatwick Road
Bayswater North Vic 3153
Phone: 03 9761 5371 Fax: 03 9720 7582